TANGANYIKA

# DEPARTMENT OF AGRICULTURE

# ANNUAL REPORT

# 1948

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TANGANYIKA

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# ANNUAL REPORT

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# DEPARTMENT OF AGRICULTURE

# ANNUAL REPORT, 1948

## INTRODUCTION : AGRICULTURAL POLICY

Agricultural policy continued as in previous years towards the maximum production of foodstuffs to build up reserves so that the Territory may become as self-supporting as possible and to contribute towards the interests of the food supplies of East Africa as a whole. At the same time, where possible efforts were made to maintain and increase the export surpluses of the chief export crops especially sisal, cotton, coffee and oilseeds as the Territory's contribution to world needs and to the general improvement of the welfare of the people.

The continuation of this policy has demanded close study of the maintenance and improvement of soil fertility. Methods adopted towards improved production are by the improvement of farming systems and cultural methods, provision of improved seed supplies and planting material, soil and water conservation, increased use of agricultural tools and implements, demonstrating mechanized farming, and training of subordinate field staff.

## SECTION I.—AGRICULTURE IN TANGANYIKA IN 1948

Weather and General Review of the Year. Crop yields were good over the greater portion of the Territory and 1948 was a prosperous agricultural year. The total acreage planted was less than in 1947 because of the variable weather conditions in the early months of the season. The resumption of rains in March however enabled a better harvest to be realized than was at first anticipated. Nevertheless there were certain areas in which crops were poor but all shortages were met from neighbouring areas. Substantial quantities of surplus food crops were sold in the local markets and although this enabled a reduction to be made in the demand for grain supplies from the East African Cereals Pool the fact remains that Tanganyika is not self-supporting in the production of food for labour for industries. This emphasises the continuing need for the priority given in the agricultural policy for increased grain production.

The following table which gives the monthly rainfall in inches for the season 1947/48 and the year at each Provincial Agricultural Officer's Headquarters station, is representative of most of the main estate and African agricultural areas :

MONTHLY RAINFALL IN INCHES FOR SEASON 1947/48 AND YEAR 1948.
PROVINCE AND PROVINCIAL STATION

| | Eastern Morogoro | | Central Dodoma | | Western Tabora | | Lake Mwanza | | Southern Highlands Iringa | | Northern Arusha | | Tanga Lushoto | | Southern Lindi | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Ins. | Average 29 years Ins. | Ins. | Average 10 years Ins. | Ins. | Average 38 years Ins. | Ins. | Average 21 years Ins. | Ins. | Average 18 years Ins. | Ins. | Average 25 years Ins. | Ins. | Average 34 years Ins. | Ins. | Average 9 years Ins. |
| October 1947 ... | 0·29 | 0·88 | 0·00 | 0·22 | 0·07 | 0·56 | 1·39 | 1·87 | 0·00 | 0·22 | 0·19 | 1·43 | 1·87 | 3·91 | 2·29 | 0·37 |
| November ... | 3·20 | 2·12 | 0·54 | 1·75 | 1·98 | 4·26 | 2·07 | 5·11 | 2·49 | 1·61 | 2·58 | 4·57 | 1·88 | 3·86 | 3·17 | 2·32 |
| December ... | 2·94 | 2·66 | 5·63 | 3·01 | 6·94 | 6·70 | 4·22 | 5·40 | 5·50 | 4·97 | 3·17 | 3·57 | 3·75 | 2·76 | 1·52 | 6·76 |
| | | Average 30 years | | Average 11 years | | Average 39 years | | Average 22 years | | Average 19 years | | Average 26 years | | Average 35 years | | Average 10 years |
| January 1948 ... | 3·97 | 3·93 | 4·25 | 5·36 | 7·05 | 4·94 | 2·26 | 3·83 | 8·50 | 7·07 | 2·92 | 2·30 | 1·98 | 2·96 | 8·74 | 5·67 |
| February ... | 1·25 | 3·83 | 0·94 | 3·38 | 3·36 | 5·05 | 1·85 | 4·50 | 2·51 | 5·09 | 1·48 | 3·48 | 1·30 | 3·04 | 3·07 | 3·88 |
| March ... ... | 7·98 | 7·35 | 3·98 | 5·24 | 8·10 | 6·74 | 5·05 | 6·30 | 7·60 | 7·19 | 4·07 | 7·28 | 5·39 | 5·93 | 7·30 | 6·29 |
| April ... ... | 5·81 | 8·41 | 0·78 | 1·72 | 2·35 | 5·21 | 6·38 | 5·28 | 7·59 | 3·63 | 18·78 | 13·93 | 8·65 | 9·24 | 8·14 | 7·24 |
| May ... ... | 2·68 | 3·79 | 0·08 | 0·16 | 0·45 | 1·12 | 3·81 | 3·81 | 0·98 | 0·57 | 4·60 | 8·43 | 7·87 | 7·37 | 0·77 | 1·43 |
| June ... ... | 0·90 | 1·20 | 0·00 | 0·10 | 0·00 | 0·13 | 0·35 | 0·70 | 0·01 | 0·04 | 1·94 | 1·29 | 4·16 | 2·15 | 0·08 | 0·42 |
| July ... ... | 0·09 | 0·53 | 0·00 | 0·00 | 0·00 | 0·00 | 0·21 | 0·62 | 0·01 | 0·01 | 0·61 | 0·48 | 1·34 | 1·34 | 0·19 | 0·25 |
| August ... ... | 0·12 | 0·40 | 0·00 | 0·00 | 0·00 | 0·04 | 0·45 | 0·79 | 0·00 | 0·02 | 0·28 | 0·85 | 0·73 | 0·87 | 0·07 | 0·23 |
| September ... | 0·67 | 0·67 | 0·00 | 0·00 | 0.36 | 0·29 | 0·54 | 0·97 | 0·12 | 0·10 | 0·05 | 0·89 | 0·35 | 0·71 | 0·23 | 0·57 |
| Total for Season | 30·70 | – | 16·20 | – | 30·70 | – | 28·58 | – | 35·31 | – | 40·67 | – | 39·27 | – | 35·67 | – |
| October ... | 2·54 | 0·86 | 0·71 | 1·02 | 0·57 | 0·55 | 2·84 | 0·85 | 0·34 | 0·27 | 1·05 | 1·39 | 1·69 | 1·26 | 0·03 | 0·55 |
| November ... | 1·75 | 2·16 | 1·09 | 1·64 | 2·00 | 4·20 | 0·49 | 4·97 | 1·47 | 1·65 | 1·98 | 4·49 | 3·86 | 3·84 | 2·25 | 2·41 |
| December ... | 5·65 | 2·67 | 1·13 | 3·25 | 3·96 | 6·71 | 3·13 | 5·35 | 2·50 | 5·00 | 1.2·70 | 3·55 | 7·21 | 4·33 | 5·07 | 6·23 |
| Total for year 1948 ... | 34·01 | 35·80 | 12·14 | 21·05 | 28·20 | 35·18 | 38·36 | 38·97 | 24·63 | 30·54 | 55·46 | 48·46 | 44·53 | 43·04 | 35·68 | 35·17 |

All figures quoted in above table are abstracted from Summary of Rainfall records for the years 1947 and 1948 Part II—Tanganyika East African Meteorological Department.

## ESTATE AGRICULTURE

The District Production Committees in Arusha, Moshi, Tanga, Iringa, Morogoro and Kilosa and various Boards, Associations and Marketing Organizations continued to give valuable assistance to non-African agriculture. The relative importance of the main plantation crops in 1948 is as follows :—

| Crop | Area under cultivation 1948 acres | Quantity produced 1948 tons | Quantity exported tons | Value £ | Place in the export trade |
|---|---|---|---|---|---|
| Sisal ... ... | 398,980 | 120,622 | 117,092 | 8,930,461 | 1 |
| Coffee ... ... | 98,800 | 15,870 | 11,268 | 897,468 | 2 |
| Tobacco ... | 12,359 | 1,989 | 1,421 | 248,420 | 3 |
| Pawpaws (Papain) | 9,600 | 121 | 130 | 195,007 | 4 |
| Tea ... ... | 8,313 | 664 | 462 | 66,145 | 5 |
| Pyrethrum ... | 2,300 | 260 | 170 | 17,537 | 6 |
| Sugar ... ... | 6,600 | 7,955 | 568 | 14,342 | 7 |

Sisal, tea, sugar, pyrethrum and papain are produced entirely by non-Africans, coffee and tobacco by both African and non-African producers over two thirds of which are African production.

Sisal continued to be the main export crop and production was well maintained. 120,622 tons were produced as compared with 105,552 tons in 1947. The Northern Province coffee crop was good average, where 7,064 tons were produced of which 2,635 tons were estate grown coffee the balance of 4,429 tons being African grown. Small quantities of estate grown coffee are produced at Mbosi in the Southern Province and in the Usambaras, Tanga Province. There was a marked increase in tobacco production in all tobacco growing areas. The Iringa planters produced over 1,900,000 lb. flue-cured leaf. Practically the whole of this crop was grown from the variety "Ehlers" which was recently introduced to Iringa District where the European tobacco growing industry is established.

The amount of tea produced was slightly higher than in 1947 but factory production of sugar decreased from 7,506 tons in 1947 to 6,097 tons in 1948. A substantial increase in future output of sugar is anticipated following changes in rationing policy which have been introduced. An indeterminate amount of crude sugar (jaggery) is produced. The estimated production of jaggery is approximately 4,000 tons annually.

Prospects for papain are not so favourable since the fall in price from Shs. 31/- per lb. in 1947 to Shs. 8/- per lb. in 1948 and a reduction in acreage is anticipated. The production of pyrethrum decreased from 506½ tons to 260 tons.

Other important crops are wheat and seed beans. The former crop showed a satisfactory increase and the latter is developing into a flourishing industry.

The Labour Utilization Boards which have been set up for the different industries worked smoothly during the year and there were few complaints about labour shortage for agriculture.

Although production of sisal was restricted to a certain extent by shortage of labour this is being overcome by mechanization in field operations.

## AFRICAN AGRICULTURE

The quality of foodcrops was good and although there were some local shortages these were met from neighbouring areas and the food supply position was generally satisfactory.

Grain production has been stimulated by a system of fixed purchase prices announced in advance of harvesting and grain storage facilities were extended during the year. Great stress has been laid on the need to improve present cultivation practices to bring about increased production by the adoption of improved methods of cultivation by the indigenous agriculturists. The response to the drive for the application of more manure to the land is slow but satisfactory particularly in the Lake, Western and Central Provinces.

Further assistance has been given by the provision of improved seed supplies and planting material. Mosaic resistant cassava is being multiplied with considerable success, mixed varieties of rice seed are being replaced with pure seed in the Lake Province and selected seed of grain and other crops produced at the Agricultural Stations are readily taken up. The demand for fruit and other trees from nurseries is in excess of supply and large quantities of onion and vegetable seed were distributed.

Copra production rose a little in 1948. The main reason for the increase in copra sales was the price but the better field sanitation of African owned coconut plantations is also having a satisfactory effect on the yield.

Cotton and Coffee are the export crops predominantly grown by Africans. The weather conditions were well suited to cotton production especially in the Lake Province where the output was the second highest crop on record. The Lake Province cotton crop yielded 45,381 bales out of a total of 53,764 bales for the Territory. The highest recorded for the Lake Province was 50,115 bales in 1941. Plans have been completed for raising the standard of cultivation and it is anticipated that yields will also be increased by replacing the present strain of cotton grown in the Lake Province by strains selected for improved yield and ginning out-turn and for resistance to the jassid pest and blackarm disease.

The Eastern Province cotton crop is greater than that of 1947 being 7,205 bales as compared with 6,139 bales the previous year. The ten-year average annual cotton production for the Eastern Province is 12,720 bales. Small quantities of cotton are produced in the Northern, Tanga and Southern Provinces.

Cotton is almost entirely an African grown crop except for a few hundred bales grown by non-Africans in the Eastern Province.

The Northern Province native grown coffee crop which amounted to 4,429 tons in the 1947/48 season is estimated to be 3,200 tons in the 1948/49 season. The 1947/48 crop was the largest on record. Slow but sure improvement is taking place in quality. Conversion to the multiple stem system of pruning continued with considerable success in the Northern Province. In Bukoba District where 6,000 tons of coffee were produced good progress has been made in re-organizing the industry.

Tobacco, another important cash crop grown by Africans developed rapidly in 1948.

The production of fire-cured leaf grown in the Songea District of the Southern Province amounted to 1,341,760 lb. The Nyamirembe Native Tobacco Board has taken over the marketing of the fire-cured crop grown in the Biharamulo and Ngara Districts of the Lake Province and Kibondo District of the Western Province.

The trial distribution of sunflower seed to all Provinces was well received and the export target of 2,000 tons was exceeded, some 2,288 tons being exported to the United Kingdom.

The approximate acreage of groundnuts is 152,700 acres (apart from the Overseas Food Corporation Scheme which is a self-contained organization). The estimated quantity produced is 16,750 tons of which 3,129 tons were exported in 1948 the balance being required for local food requirements.

The sesame crop, mainly grown in the Southern Province was less than in 1947 due to a decrease in acreage. 1948 was an exceptional good year for honey and beeswax. The output of gum arabic remained about the same but quality has improved in recent years as a result of grading.

Considerable advance has been made in the long term aspect of African agriculture to increase productivity without increasing the area under cultivation and to relieve the pressure of cultivation on the light and marginal lands. Several major development and rehabilitation projects are in progress and areas are selected for pilot land utilization schemes and trials with mechanical units.

## GRADING AND MARKETING OF PRODUCE

The marketing of most agricultural products continued under distributional and price control and the general trend of prices continued upwards. The marketing of sisal through the Sisal Controller on behalf of the Board of Trade was extended in 1948 until the end of the year but with effect from 1st December, 1948, commercial dealings in the 1949 sisal crop are permitted. The price of sisal rose from £78 9s. to £88 9s. per ton for No. 1 Grade f.o.r. port of shipment.

The coffee crop was disposed of under contract to the Ministry of Food. The Coffee Board of Tanganyika has been reconstituted during the year to admit of the representation of the Bukoba and Kilimanjaro Native Coffee Industries. The Ministry of Food agreed in 1948 to a common schedule and specification for both African and non-African coffees. As a result all Tanga and Northern Provinces coffee was cured by the Tanganyika Coffee Curing Company of which the Moshi Native Coffee Board and the Tanganyika Coffee Growers' Association are equal shareholders. There has been a definite improvement in quality and the marketing under a single schedule should stimulate further improvements.

The Bukoba crop was marketed through the Bukoba Native Coffee Board. The Board supplies a substantial proportion on contract to the Ministry of Food and disposes of the balance by auction in Mombasa. The Department of Agriculture provides grading facilities for coffee exported from Bukoba District and all exports must conform to specific requirements. Good progress has been made with the re-organization of the Bukoba Native Coffee industry under the Bukoba Native Coffee Board's scheme of zoning for marketing the growers coffee, installing hulling machinery and initiating co-operation.

The Southern Highlands Province coffee crop grown in Mbosi area of Mbeya and in Rungwe District amounting to some 400 tons in 1948 was marketed through the Mbosi Planters' Association and the Rungwe growers Co-operative Society.

The greater part of the Iringa Flue-cured Tobacco crop was disposed of to tobacco factories in East Africa. This tobacco which amounted to

1,117,089 lb. was to a large extent graded on the tobacco farms and despatched direct to the tobacco factories. The balance of the flue-cured production was handled and processed at the tobacco grading sheds Iringa. Production which increased from 480,000 lb. in 1947 to 1,901,383 lb. in 1948 realized an average price of Shs. 1/40 per lb. which makes the value of the crop £113,096 approximately. The non-Native Tobacco Boards rendered valuable assistance to the growers but disagreements still exist among the growers over marketing. The Songea African grown fire-cured crop was marketed through a Co-operative Union and in 1948 for the first season the Nyamirembe Native Tobacco Board marketed the tobacco crops of Biharamulo, Ngara and Kibondo Districts.

Cotton was disposed of under contract by bulk sales to the United Kingdom and India. The price paid to the producer was twenty-four cents per lb. first quality in the Lake Province and it was based on fifty-two and a half cents per kilo first quality in the Eastern Province and elsewhere in the Territory as compared with sixteen cents per lb. and forty-two cents per kilo respectively in 1947.

The whole of the 1948 crop of sunflower seed was exported to the Ministry of Food through an exporters pool at £33 10s. per ton f.o.b. The crop exceeded all expectations. The exporters pool will cease to operate in 1949 after which supplies may be exported to destinations outside the United Kingdom at prices ruling according to supply and demand.

Supplies of copra, coconut oil and copra cake were subject to distributional and price control. Quotas of coconut oil are made to soap manufacturers, soap is sold at fixed prices and the export of soap is controlled. Surplus coconut oil and copra cake are exported and these surpluses are mainly required by Kenya. The Tanganyika prices for copra, coconut oil and copra cake are adjusted in agreement with other East African Governments.

The marketing of the Muheza orange crop was again carried out by Agents on behalf of the local Native Treasuries.

Maize was purchased by the Produce Controller at a guaranteed price and wheat marketed through the Kenya Farmers' Association. Other African grown produce was mostly marketed through Native Authority produce markets which functioned fairly satisfactorily.

## LOCUSTS

The International Red Locust Control Service completed the 1947/48 campaign in the Rukwa Valley primary Red Locust outbreak area during the last week of March. Reports from this service record that the campaign concluded most successfully and at the end of May the position remained quiet and no reports of swarms were recorded. The preparations for 1948/49 campaign were completed in October and the position at the end of December in the Rukwa Valley was most satisfactory.

Mr. F. B. Notley, Entomologist, who organized the campaign in the breeding grounds in the Malagarassi Ugalla swamps completed a highly successful campaign in May, 1948. This campaign was carried out in full collaboration with the International Red Locust Control Service. Although the hopper infestation was lighter than had been expected all known hopper bands were destroyed and no reports of escape swarms received. A full report

of this campaign was submitted to the Conference of the International Red Locust Control at Salisbury during the last week in May and it is gratifying to record that a congratulatory telegram was received from the Secretary of State for the Colonies on the work done.

Tanganyika remained clear of all species of locusts from May until the end of the year.

## PESTS AND DISEASES

Generally crops were fairly free from very serious outbreaks of pests and diseases in 1948.

The Entomologist carried out a special investigation of a heavy infestation of Antestia of the Bugufi coffee crop, Ngara District.

Blackarm on cotton was serious and widespread in the Lake Province while jassid and aphis were not serious. The attack of American bollworm in the Eastern Province was lower than usual.

The sisal weevil increased rapidly in the Tanga Province this year.

Stalk borer was not so prevalent in 1948 but there was a widespread outbreak of army worm in the Northern, Central and Western Provinces which caused a considerable amount of damage mainly to pasture.

Kromnek of tobacco spread rapidly through the Iringa District but it is fortunately a mild form. New strains of Irish Blight in potatoes and stem rust in wheat have been found in the Territory. Particular attention was given by the Plant Pathologist to diseases of French beans and of pawpaws.

Every assistance was given to applicants for permits to import plants, but restrictions considered necessary under the Plant Pest and Disease (Import) Regulations, 1930, were enforced in order to protect economic crops from risk of introduction of new pests and diseases.

Dr. Jepson, Entomologist, who left Tanganyika in 1948 to take up an appointment at the Imperial College of Science and Technology prepared a short summary of entomological work in Tanganyika for the fifth Commonwealth Entomological Conference. A copy of this valuable record describing the present position of entomological problems in Tanganyika is included in Section V of this report.

## AGRICULTURAL EXPORTS 1948

The total quantity of agricultural produce exported in 1948 was substantially higher than in 1947. There were important increases in sisal, cotton and tobacco. Although there was a certain carry over from the previous year the increase is mostly due to a favourable season and more favourable marketing and transport facilities. Other important increases were beeswax and honey. Coffee exports were lower following the previous seasons heavy output and pyrethrum dropped by half that of the previous years output. Production of most plantation crops was well maintained. The substantial increase in exports of tobacco, beeswax and onions makes the tonnage exported the highest on record for these products.

The quantity of papain exported was higher than previously recorded but the total value considerably lower.

The following table shows the principal exports of the Territory compared to those of former years :—

## EXPORT CROP FIGURES

The following table shows the principal exports of the Territory since 1940 with the values of those for 1948:—

| | Maximum output for export prior to 1948 | | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 | Total Value | Value per ton f.o.b. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Amount | Amount | Amount | Amount | Amount | Amount | Amount | Amount | Amount | | |
| | Year | Tons | Tons | Tons | Tons | Tons | Tons | Tons | Tons | Tons | Tons | £ | £ |
| Sisal ... ... ... | 1942 | 136,237 | 78,528 | 75,195 | 136,237 | 96,598 | 111,848 | 110,637 | 111,521 | 95,856 | 117,092 | 8,930,461 | 76·09 |
| Sisal (manufactured) | 1936 | 2,325 | 5 | 15 | 26 | 30 | 8 | – | – | – | – | – | – |
| Cotton Lint ... | 1941 | 13,106 | 10,624 | 13,106 | 8,009 | 7,002 | 5,944 | 7,192 | 3,958 | 7,045 | 9,893 | 1,328,178 | 134·10 |
| Coffee ... ... | 1935 | 18,588 | 15,634 | 13,667 | 14,828 | 10,898 | 15,561 | 14,441 | 10,021 | 13,858 | 11,268 | 897,468 | 79·71 |
| Groundnuts ... ... | 1936 | 22,786 | 8,185 | 11,312 | 13,193 | 1,752 | 627 | 955 | 475 | 3,534 | 3,129 | 82,884 | 26·51 |
| Hides and Skins ... | 1947 | 4,609 | 3,946 | 3,512 | 2,993 | 2,339 | 2,871 | 2,259 | 3,527 | 4,609 | *3,310 | 460,423 | 139·10 |
| Copra ... ... | 1928 | 9,318 | 3,095 | 3,620 | 3,700 | 2,816 | 1,368 | 5 | 312 | 40 | 48 | 1,472 | 20·66 |
| Sesame ... ... | 1938 | 5,241 | 2,052 | 3,018 | 3,563 | 3,180 | 1,712 | 1,441 | 929 | 493 | 928 | 21,623 | 23·05 |
| Rice ... ... ... | 1941 | 17,965 | 15,204 | 17,965 | 17,948 | 4,673 | 4,494 | 2,171 | 70 | 2,615 | 6 450 | 152,921 | 23·74 |
| Millet and Mtama ... | 1928 | 7,732 | 4,514 | 3,280 | 3,348 | 913 | 1,501 | 3,804 | 315 | 4,741 | 1,914 | 30,655 | 16·05 |
| Maize ... ... | 1934 | 2,901 | 2,831 | 940 | 713 | 9 | – | 20 | – | 1,875 | †3,070 | 73,398 | 23·90 |
| Beeswax ... ... | 1945 | 795 | 468 | 712 | 348 | 586 | 627 | 795 | 732 | 410 | †905 | 261,356 | 288·76 |
| Tea ... ... ... | 1946 | 625 | 316 | 340 | 483 | 503 | 328 | 400 | 625 | 446 | 462 | 66,145 | 143·17 |
| Sugar ... ... | 1941 | 5,454 | 4,876 | 5,454 | 4,380 | 1,813 | 4,293 | 1,130 | 315 | 838 | 568 | 14,342 | 25·75 |
| Gums (Copal and Arabic) ... ... | 1944 | 2,567 | 965 | 1,405 | 904 | 390 | 2,567 | 1,712 | 1,540 | 1,554 | 1,490 | 78,350 | 52·58 |
| Ghee ... ... | 1942 | 1,385 | 1,213 | 1,125 | 1,385 | 750 | 400 | 249 | 327 | 44 | 272 | 45,161 | 166·60 |
| Wheat ... ... | 1945 | 4,511 | 1,450 | 2,475 | 2,166 | 1,887 | 1,960 | 4,511 | 324 | – | – | – | – |
| Tobacco (unmanufactured) | 1944 | 1,122 | 506 | 649 | 820 | 1,052 | 1,122 | 935 | 924 | 667 | †1,421 | 248,420 | 174·96 |
| Rubber ... ... | 1944 | 1,314 | 13 | 7 | 213 | 451 | 1,314 | 2,320 | 1,019 | 49 | 54 | 10,354 | 191·74 |
| Vegetable oils (Coconut and Groundnut) ... | 1940 | 2,268 | 2,268 | 1,718 | 1,720 | 1,056 | 983 | 1,801 | 1,009 | 900 | 1,463 | 120,531 | 82·37 |
| Papain ... ... | 1947 | 109 | 18 | 15 | 21 | 39 | 64 | 101 | 100 | 109 | †130 | 195,007 | 1,500·05 |
| Onions ... ... | 1944 | 2,007 | 989 | 1,265 | 1,204 | 1,896 | 2,007 | 1,849 | 1,925 | 1,754 | †2,418 | 55,590 | 22·99 |
| Pyrethrum ... ... | 1945 | 697 | 244 | 229 | 305 | 306 | 396 | 697 | 668 | 241 | 170 | 17,537 | 103·15 |
| Fats, including substitute for Ghee and Butter ... | 1944 | 1,247 | – | 1,039 | 273 | 664 | 1,247 | 650 | 783 | 71 | 1,689 | 16,921 | 10·00 |
| Mangrove Bark ... | 1942 | 7,291 | 4,655 | 6,383 | 7,291 | 3,205 | 5,100 | 4,927 | 5,490 | 3,408 | – | – | – |
| | | | 162,595 | 168,446 | 226,071 | 144,808 | 168,342 | 165,002 | 146,909 | 145,157 | 168,153 | 12,850,137 | |

*Includes 2,536 tons hides and 774 tons skins (sheep and goat). †New highest export tonnage.

## NOTES ON MAIN CROPS

### Sisal

The production, export and value of exported sisal was greater than in 1947. The 1948 production was the highest on record, this achievement is due to favourable climatic conditions, new plantings coming into bearing and adequate labour. The exports were second only to those of 1942 when the highest recorded tonnage was exported, this being mainly due to the accumulation of previous years stocks held up during the early part of the war. The value of exports in 1948 was £3,461,018 greater than the value in 1947. Higher prices combined with an increased quantity of over 21,000 tons accounted for this substantial increase in value.

The production of sisal in 1900 was 750 tons, this increased to 7,000 tons in 1910, 16,600 tons in 1920 and 50,000 tons in 1930. The production exports and value of exports in 1940 and each year since 1945 were :—

| Year | Production Tons | Exports Tons | Value £ |
|---|---|---|---|
| 1940 ... ... ... | 120,000 ... | 78,528 ... | 1,499,849 |
| 1945 ... ... ... | 112,218 ... | 110,637 ... | 3,068,744 |
| 1946 ... ... ... | 106.808 ... | 111,521 ... | 3,916,405 |
| 1947 ... ... ... | 105.552 ... | 95,856 ... | 5,469,443 |
| 1948 ... ... ... | 120,622 ... | 117,092 ... | 8,934,461 |

The quantity produced by Provinces was :—

| | 1946 | 1947 | 1948 |
|---|---|---|---|
| | Tons | Tons | Tons |
| Tanga and Northern Provinces ... ... | 60,609 ... | 60,599 ... | 68,464 |
| Eastern Province and Central Line ... | 36,075 ... | 33,839 ... | 38,447 |
| Southern Province ... ... ... ... | 10,124 ... | 11,114 ... | 13,711 |
| | 106.808 ... | 105.552 ... | 120,622 |

The Sisal Controller continued to purchase and ship the output on behalf of the Board of Trade but towards the end of 1948 a decision was reached to permit private trade in sisal in 1949.

Production was less hampered by labour difficulties, or food supplies for labour in 1948 and shipping space was more satisfactory. The improvement of supplies of agricultural machinery enabled sisal estates to practice mechanization to a greater extent and as more machinery becomes available there is a tendency to mechanize field operations.

The Sisal Experimental Station, Mlingano, the staff of which is seconded from the Department of Agriculture is now financed entirely by the sisal industry. This station is responsible for conducting field trials dealing with cultivation, spacing, cutting, and manuring of sisal as well as work concerned with bulbil nurseries and the use of insecticides and biological control for protecting sisal against weevil.

### Coffee

The total exports for 1948 were 11,259 tons as compared with 13,858 tons in 1947. The drop in exports was caused by the Bukoba crop being below average through damage to the blossom by heavy rains in 1947 and by drought during January and February, 1948. The Northern Province crop was good especially the African grown crop in Moshi District which was the largest on record. Of the total exports for the year 4,332 tons were "hard" or Bukoba coffees the balance of 6,927 tons were "mild" coffees being mainly the

production of the arabica coffee grown on the lower slope of Mount Kilimanjaro and Mount Meru.

The estimated production of coffee in 1948 in each Province was as follows :—

| | African grown Arabica | Robusta | Estate grown Arabica | Total Tons |
|---|---|---|---|---|
| Northern Province : | | | | |
| Moshi | 4,235 | — | 1,370 | 5,605 |
| Arusha/Mbulu | 194 | — | 1,265 | 1,459 |
| Tanga Province : | | | | |
| Usambaras | 51 | 10 | 46 | 107 |
| Lake Province : | | | | |
| Bukoba area | 1,140 | 4,998 | — | 6,138 |
| Southern Highlands Province : | | | | |
| Mbosi/Rungwe | — | — | 402 | 402 |
| | 5,620 | 5,008 | 3,083 | 13,711 |

## African Grown Coffee

The Northern Province African grown crop was 4,429 tons. This is the highest production recorded. Production during the past five seasons was as follows :—

| 1943/44 | 1944/45 | 1945/46 | 1946/47 | 1947/48 |
|---|---|---|---|---|
| 2,193 | 4,080 | 3,196 | 2,479 | 4,429 |

The quality of the crop is steadily improving and the sale of the crop to the Ministry of Food under the five-year contract should stimulate further improvements. The Moshi Native Coffee Board has concluded successfully its third season and the Board opened the new coffee training school at Lyamungu during the year. An Agricultural Assistant seconded as Headmaster took up his duties in October, 1948. The Board has also started work at three of the ten propagating centres in 1948.

The Bukoba crop dropped from 8,450 tons in 1947 to 6,130 tons in 1948 because of adverse climatic conditions.

Quantities marketed in tons during the five-year period 1944 to 1948 were as follows :—

| | 1944 Tons | 1945 Tons | 1946 Tons | 1947 Tons | 1948 Tons |
|---|---|---|---|---|---|
| Arabica | 3,987 | 2,135 | 1,207 | 2,637 | 1,140 |
| Robusta | 5,434 | 5,970 | 3,363 | 5,813 | 4,998 |
| | 9,421 | 8,105 | 4,570 | 8,450 | 6,138 |

The whole of the Bukoba crop is now exported by the Bukoba Native Coffee Board which buys, grades and markets the whole of the African grown arabica and robusta coffees grown in the Bukoba area.

## Estate Coffee

The following table shows the production of the estate coffee for the past five years in each Province.

| Year | Northern Province Tons | Tanga Province Tons | Southern Highlands Province Tons | Total Tons |
|---|---|---|---|---|
| 1944/45 | 2,558 | 116 | 115 | 2,789 |
| 1945/46 | 2,992 | 110 | 306 | 3,408 |
| 1946/47 | 827 | 45 | 60 | 932 |
| 1947/48 | 2,635 | 46 | 402 | 3,083 |

The 1947/48 crop was good and planters in the Northern Province have renewed their interest in the crop since the price of coffee has been maintained at a high level with a tendency to rise and since the papain market has become uncertain. Neglected and uneconomic coffee is being uprooted and nurseries prepared with seed from selected material.

### Cotton

The Lake Province had short intermittent rains in the planting season followed by a long break in January and February, this was followed by inordinately long rains which were not too heavy and the season was favourable for the cotton crop for the Province as a whole. A large crop of cotton was harvested in Sukumaland and Mwanza District was responsible for the record quantity of 25,361 bales, this combined with all other districts in the Lake Province produced 45,381 bales which was the second largest cotton crop on record.

The Eastern Province crop was well below average mainly because of the abnormal climatic conditions in the Rufiji. The small production of the Tanga, Southern and Northern Provinces was also adversely affected by the weather but cotton production in these Provinces especially the Southern and Northern Provinces has gradually decreased in recent years.

The production of lint in bales of 400 lb. in the various Provinces compared with the average production for the previous ten years is shown in the following statement :—

| Province | Average | 1948 |
|---|---|---|
| Lake ... ... | 34,119 ... | 45,381 |
| Eastern ... ... | 12,320 ... | 7,205 |
| Tanga ... ... | 2,207 ... | 914 |
| Southern ... ... | 932 ... | 148 |
| Northern ... ... | 682 ... | 175 |
| | | 53,823 |

### Groundnuts

Apart from the Overseas Food Corporation which is a self-contained organization the African grown groundnut production was estimated at 16,750 tons compared with 21,200 tons in 1947 and 14,140 tons in 1946. 3,129 tons of this production were exported but the greater part of the crop is grown for local food supplies.

The African grown groundnut crop in the Central Province was poor and yields were reduced by low rainfall and disease, the Western Province yields are said to be decreasing probably due to a general decline in soil fertility, in the Lake Province the crop has lost its former prominent position in favour of cotton.

The Overseas Food Corporation assumed responsibility for the management of the groundnut scheme in 1948. This scheme which is based on highly mechanized agricultural development for the production of groundnuts continued work in the selected area at Kongwa in the Central Province where clearing was started in 1947. Preparations for large scale production were in progress at Urambo, Western Province and in the Southern Province where the largest area will be developed.

### Sunflower

The trial distribution of sunflower seed to African growers exceeded all expectations. The years export target of 2,000 tons was exceeded and 2,288 tons were exported. Further expansion of this crop may take place but it is not intended that sunflower should be produced at the expense of food crops.

### Sesame

Climatic conditions in 1948 were favourable to the sesame crop. The estimated production was 5,700 tons in the Southern Province the main producing area.

928 tons were exported but large quantities are milled in the Territory to meet local oil requirements.

### Grains

The production of grains in 1948 was well below the bumper harvest of 1947 nevertheless good crops in general were obtained in most Provinces.

In areas where bumper crops had been harvested in 1947 there was tendency for cultivators to postpone preparation of the land, this combined with planting rains of short duration in many areas caused a reduction in total area planted. An improvement in the climatic conditions however enabled good crops to be harvested except in the Central Province and localized areas in other Provinces where the rainfall was inadequate.

### Rice

Weather conditions were not so favourable for paddy as in 1947 consequently the amount of surplus paddy available for sale was considerably less.

The recorded sales of paddy amounted to 18,313 tons as compared with 27,605 tons the previous season as follows :—

| Province | 1947 | | 1948 |
|---|---|---|---|
| | Tons | | Tons |
| Lake ... ... ... ... | 8,200 | ... | 7,660 |
| Eastern ... ... ... ... | 6,444 | ... | 2,556 |
| Western ... ... ... ... | 3,933 | ... | 1,982 |
| Southern ... ... ... ... | 3,586 | ... | 1,598 |
| Southern Highlands ... ... | 3,382 | ... | 2,475 |
| Tanga ... ... ... ... | 2,000 | ... | 2,017 |
| Central ... ... ... ... | 60 | ... | 24 |
| | 27,605 | ... | 18,312 |

### Wheat

The Northern Province Wheat Scheme was wound up by the end of 1947, but apart from the quantity formerly produced by the Wheat Scheme, production in the Northern Province showed a satisfactory increase. This increase was mainly estate produced. The quality of the crop was higher than usual and disease was negligible.

Production compared with 1947 was as follows :—

| | 1947 | | 1948 |
|---|---|---|---|
| | Tons | | Tons |
| Estate grown ... ... ... | 1,985 | ... | 3,326 |
| African grown ... ... ... | 274 | ... | 336 |
| Wheat Scheme ... ... ... | 2,267 | ... | — |
| | 4,526 | ... | 3,662 |

The Western Province marketed 821 tons, Songea District 420 tons and the Southern Highlands Province 98 tons as compared with 51, 620 and 50 respectively the previous year.

### Maize, Millets and Sorghum

The season was very favourable for grain production in the Northern and Tanga Provinces, satisfactory in the Lake, Eastern, Western and Southern Provinces but unfavourable in the Central Province. Substantial surpluses were sold and the following statement shows the recorded sales for 1948 compared with the quantities sold from the previous year's bumper harvest.

| Province | 1947 | 1948 |
|---|---|---|
| | Tons | Tons |
| Southern ... ... ... | 14,821 | 4,301 |
| Eastern ... ... ... | 13,680 | 10,438 |
| Northern ... ... ... | 11,314 | 17,196 |
| Southern Highlands ... ... | 8,002 | 8,564 |
| Central ... ... ... | 7,235 | 1,000 |
| Tanga ... ... ... | 6,425 | 7,200 |
| Lake ... ... ... | 4,200 | 3,565 |
| Western ... ... ... | 3,835 | 5,009 |
| Total ... | 69,512 | 57,313 |

The 1947 record maize production in the Northern Province was beaten, the greater part of the increase being African grown maize. The acreage of estate grown maize was about the same with a slight increase in yield due to favourable rains in the maze belt. Another outstanding increase in maize production was recorded by Mpanda District, Western Province.

Sorghum production was satisfactory in most areas but the quantity of surplus sorghum which became available from the Southern Province was comparatively small. The carry over from the previous years exceptionally good crop was so great that the maximum area was not planted and too much of the crop was late planted with the result that the harvest although sufficient for local requirements restricted the surplus available for export.

### Copra

The season was average.

The total production of copra for the year was 8,259 tons as compared with 5,448 tons the previous year when production fell off badly. 48 tons copra were exported as compared with 10 tons the previous year. In addition 1,194 tons of coconut cake, 900 tons refined coconut oil and 559 tons unrefined coconut oil were exported mainly to Kenya.

More attention was given to the improvement of the copra industry by the employment of Agricultural Assistants on coconut field sanitation.

### Tea

The area planted is 8,313 acres and the total production of 1,491,409 lb. in 1948 was an increase over the previous year. Production in the Usambaras was lower than it has been since 1944 but the season was not favourable. The total production of the Southern Highlands showed an increase of 139,869 lb. Weather conditions in Rungwe were ideal but the precipitation at Mufindi was insufficient, which emphasises the urgency for re-afforestation.

A comparison of production figures since 1945 is as follows :—

| | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|
| | lb. | lb. | lb. | lb. |
| Usambaras ... | 398,000 | 339,192 | 342,000 | 323,260 |
| Mufindi ... | 559,243 | 671,267 | 573,957 | 599,723 |
| Rungwe ... | 320,471 | 470,460 | 454,557 | 568,426 |
| | 1,277,714 | 1,480,919 | 1,370,514 | 1,491,409 |

Infilling of old plantings was carried out in the Southern Highlands and new plantings amounted to 72 acres. Further planting is taking place in the Usambaras where a number of new estates are being developed.

## Sugar

A reduced sugar production is recorded at the one estate producing factory sugar in the Northern Province.

Production for the past three years was as follows :—

| | 1946 | 1947 | 1948 |
|---|---|---|---|
| | Tons | Tons | Tons |
| Refined Sugar ... ... ... ... | 7,250 | 7,202 | 5,860 |
| Unrefined Sugar ... ... ... ... | 400 | 304 | 228 |
| | 7,650 | 7,506 | 6,088 |

A consignment of toads (Bufu marunus) was received from Trinidad for use against the sugar cane grub.

The production of "jaggery" to meet local demand at a number of small plants in various parts of the Territory is estimated at 4,000 tons.

## Tobacco

(a) *Fire Cured.* The Songea fire-cured crop was 1,341,760 lb. compared with 389,740 lb. in 1947. This was the second largest crop produced in Songea District the largest being 1,415,680 lb. in 1943. The main factors contributing to the increase in production were the favourable climatic conditions, the higher prices paid to the growers for leaf tobacco and better marketing arrangements. There was a big demand for seed for the 1948 crop.

The Nyamirembe fire-cured crop amounted to 291,200 lb. compared with 179,200 lb. in 1947. The Nyamirembe Native Tobacco Board controls the marketing of the crop grown in Biharamulo, Ngara and Kibondo Districts. Biharamulo District produced 246,400 lb., Ngara District 35,840 lb. and Kibonda District 8,960 lb. approximately. The Biharamulo crop was a record one and the yield per acre increased from 34 kgs. to 140 kgs. approximately. A good start was made with the first season's organized production in Kibondo District.

(b) *Flue Cured Tobacco.* The expansion of flue-cured tobacco since the Iringa growers were attracted back to tobacco production by the higher prices may be seen from the following figures of production since 1945 :—

| | lb. |
|---|---|
| 1945 ... ... ... | 1,537,903 |
| 1946 ... ... ... | 1,027,164 |
| 1947 ... ... ... | 749,389 |
| 1948 ... ... ... | 1,901,383 |

1,084,014 lb. of tobacco were graded on the farms with check grading at the grading sheds Iringa, and 784,294 lb. were handled and processed in the sheds. The average price was Shs. 1/40 per lb. A new reception, processing

and baling shed was built but space is still inadequate to deal with the increased crop hence the necessity for grading at the farms which was carried out by a ruling of the Non-Native Tobacco Board. The Tobacco Board did much for the mutual benefit and the future of the industry during the year.

(c) *Roll Tobacco.* The crop in the Usambaras was 154,560 lb. which is little more than half of the 1947 crop. This reduction was due to excess of rains at harvest time. The production of roll tobacco is mainly centred in the Southern, Eastern and Tanga Provinces. Production is estimated at 674,000 lb. annually.

### Pyrethrum

Production over the past five years is as follows :—

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| | Tons | Tons | Tons | Tons | Tons |
| Northern Province ... | 201 | 306 | 298 | 204 | 101 |
| Southern Highlands Province ... | 197 | 391 | 370 | 303 | 154 |
| | 398 | 697 | 668 | 507 | 255 |

The further decrease in production was caused by the unsettled market conditions at the end of 1947. With a more promising market for pyrethrum again, attention has been directed to increased production.

### Papain

The price of papain dropped steadily during the year until it reached the pre-war price of Shs. 8/- per lb. Prices had been Shs. 31/- per lb. in 1947 and the average price in 1948 was Shs. 11/- per lb. Consequently a high proportion of the land is being neglected. The exports of papain amounting to 130 tons worth a total of £195,007 compared with 109 tons in 1947 the total value of which was £306,485 indicates that at the present low prices the industry is not likely to be maintained at its present level of production. Papain is not graded and so far proposals for grading this product and regulating the industry have been given little support by the producers.

### Seed Production

The weather was favourable for the production of the better quality seeds and during the year 1,685 tons of beans, 63 tons peas as well as several tons of flower and vegetable seeds were exported which compared with 560 tons in 1947 and 563 tons in 1946 was a satisfactory increase. The value of the seeds was £90,000 approximately compared with £25,470 in 1947. Practically the whole production was from Arusha District.

### Onions

The Northern Province crop was maintained at a satisfactory level and 2,085 tons were exported as compared with 1,959 tons in 1947. Prices averaged about Shs. 7/50 per frasila. Fair quantities are produced elsewhere in the Territory for local markets.

### Minor Crops

*Cinchona.*—There are thirteen estates in the Usambaras with cinchona planted. There were slight increases in planting. Production over the last five years was as follows :—

| 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|
| Tons | Tons | Tons | Tons | Tons |
| 60 ... | 71 ... | 92 ... | 49 ... | 68 |

*Derris.*—This crop is on the decline. Production for the year was nine tons and there are only three estates producing.

Production over the past five years was :—

| 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|
| Tons | Tons | Tons | Tons | Tons |
| 16 | 39 | 44 | 15 | 9 |

*Essential Oils.*—Bitter orange production was 7·32 tons as compared with $2\frac{1}{2}$ tons in 1947. Small quantites of geranium oil and lemon grass oil are produced in the Territory.

*Condiments.*—Tanga Province produced 2·4 tons of black pepper and 5·5 tons of chillies as compared with 2·3 tons black pepper and 5·8 tons chillies in 1947.

*Palm Oil.*—The Kigoma palm kernel industry, Western Province, made further progress and is likely to develop further. Exports since 1946 when this trade was revived are :—

| | 1946 | 1947 | 1948 |
|---|---|---|---|
| | Tons | Tons | Tons |
| Palm Kernel ... ... | 10 | 192 | 263 |

The quantity of palm oil marketed was 11·9 tons compared with 34·4 tons the previous year.

Tanga Province produced 27·2 tons of palm oil in 1948 compared with 25 tons in 1947.

Ten acres of land have been planted with Congo pedigree oil palm seed. The trees will serve as a seed supply for further planting.

*Tung Oil.*—There were no new plantings in the Usambaras where the acreage is approximately 200. The production was processed locally and $3\frac{1}{2}$ tons tung oil was produced. Small acreages of tung oil trees are grown at the higher elevations in the Southern Highlands Province but production is not yet on a commercial scale.

*Cocoa.*—Production amounted to 3 tons as compared with 2·85 tons the previous year.

*Cashewnuts.*—This crop which is essentially suited to the coastal belt is produced in commercial quantities in the Southern Province and in Uzaramo District and Mafia Island, Eastern Province. As a result of higher prices there has been a marked increase in planting of cashew trees and although the full effect of the recent plantings will not be felt for some time the 1948 production is the highest recorded in the last five years. The Southern and Eastern Provinces sales in tons since 1944 are as follows :—

| Province | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Southern ... | 355 | 3,971 | 1,900 | 1,312 | 4,533 |
| Eastern ... | 463 | 347 | 281 | 348 | 661 |
| Total ... | 818 | 4,318 | 2,118 | 1,660 | 5,194 |

At present almost the entire crop is exported to India for processing before being sent to America where there is a big demand. Production and trade justify a modern factory for husking the nuts in the Territory but so far nothing definite has materialized from the enquiries made about the possibilities of establishing a factory.

*Native Starch.*—Production fell from 121 tons in 1947 to 82 tons in 1948 in the Eastern Province and increased from 12 tons to 18·9 tons in the Southern Province.

*Beeswax and Honey.*—1948 was an exceptionally good year for honey and beeswax. The quantity of beeswax exported was 905 tons. This exceeded the highest export tonnage previously recorded which was 795 tons in 1945.

Exports for the past five years were :—

| Year | Beeswax | | Honey | |
|---|---|---|---|---|
| | Tons | Value £ | Cwts. | Value £ |
| 1944 | 627 | 110,276 | 3,462 | 6,430 |
| 1945 | 795 | 132,297 | 3,045 | 5,690 |
| 1946 | 732 | 189,733 | 1,701 | 4,078 |
| 1947 | 410 | 131,136 | 2,363 | 7,242 |
| 1948 | 905 | 261,356 | 4,779 | 12,959 |

*Gums.*—The export of gums was slightly lower than that of the previous year. The reduction is attributed to the plague quarantine restrictions which prevented the usual movement of gum collectors in parts of the gum arabic areas of the Central and Western Provinces.

The following are the exports since 1944 :—

| Year | Tons | Value £ |
|---|---|---|
| 1944 | 2,567 | 114,657 |
| 1945 | 1,712 | 107,274 |
| 1946 | 1,540 | 91,962 |
| 1947 | 1,554 | 85,583 |
| 1948 | 1,490 | 78,350 |

*Rubber.*—Production of Para rubber is confined entirely to one estate in the Eastern Province. Production in 1948 was 122,481lb. compared with 103,226lb. in 1947.

*Castor Seed.*—Production is steadily rising. Comparative outputs since 1945 from the Eastern and Central Provinces in tons are :—

| | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|
| Eastern Province | 268 | 342 | 698 | 850 |
| Central Province | 160 | 94 | 306 | 473 |
| | 428 | 436 | 1,004 | 1,323 |

This crop is suited to the drier parts of Morogoro and Kilosa Districts, Eastern Province and Mpwapwa District, Central Province. The 1948 production was considerably increased following the further rise in price in 1947.

## Root Crops

*Cassava.*—Replanting was carried out to keep the reserves in the ground up to the necessary requirements for Provincial famine reserves. The good grain harvest in 1948 again brought on to the market cassava surplus to local requirements from the Southern Province and the Central Line. 14,052 tons of cassava were exported of which 10,100 tons were sold to the Ministry of Food Animal feeding stuff Division. A large quantity of cassava exported in 1948 was from the crop harvested in 1947 of which considerable stocks remained in the hands of the growers.

*Sweet Potatoes.*—Reserves of this crop were built up during the favourable crop year in 1947 and planting material was adequate. Large areas were planted as an additional food reserve and a large scale sweet potato

planting campaign organized in the Central Province was particularly successful.

*European Potatoes.*—Good crops were harvested in the Southern Highlands Province where production exceeds local demand and the high cost of transport limits exports. Potatoes grown in the Iringa District supplied the Overseas Food Corporation and supplies from Mbeya District were sent to Dar es Salaam market. 958 tons passed through the market as compared with 618 tons in 1947 and 244 tons in 1946.

Production in the Usambaras, Tanga Province, is severely hampered by blight. Prior to 1943 the exports ranged between 1,500 and 2,000 tons. In 1948 only 149 tons were exported and 30 tons sold locally.

All the varieties resistant to Irish blight on trial at Lushoto succumbed to blight but the work of testing for the introduction of a blight resistant variety will recommence in 1949.

## Legumes

The quantity of mixed beans produced was lower than in the previous years and there was a shortage of legumes in some areas and legumes for sisal estates were in short supply in Tanga Province.

Legumes were in great demand in the Southern Highlands and production was barely sufficient for local requirements. Beans and peas do well in suitable areas and further production is encouraged.

1,814 tons were sold through the produce markets of the Southern Province of which 662 tons were exported.

Some 10,627 tons passed through the Provincial produce markets as compared with 14,657 tons in 1947.

The surplus quantities sold through produce markets in each province were as follows :—

| | Mixed Beans | Haricot Beans | Chick Peas | Cow-Peas | Gram | Pigeon Peas | Soya Beans | Bambara |
|---|---|---|---|---|---|---|---|---|
| Northern ... ... | 617 | 125 | — | — | — | — | — | — |
| Tanga ... ... | 168 | — | — | 150 | — | — | — | — |
| Central ... ... | — | 18 | — | — | — | — | — | — |
| Lake ... ... | 1,408 | — | 2,330 | 938 | 52 | — | 207 | — |
| Southern ... ... | 200 | — | — | 1,614 | — | — | — | — |
| Western ... ... | 615 | 48 | 16 | 190 | 16 | 66 | — | 196 |
| Southern Highlands ... | — | — | — | 709 | — | — | — | — |
| Eastern ... ... | 350 | — | — | 156 | 70 | 158 | — | — |
| Total ... | 3,358 | 191 | 2,346 | 3,757 | 148 | 224 | 207 | 196 |

## Vegetables and Fruits

While cultivation of vegetables by native growers is continuously encouraged and while many settlers have increased their area under green crops the substantial addition to supplies does not keep pace with rising demand.

Production of vegetables in the Usambaras is on the increase the bulk of which are marketed in Tanga. Production increased from 361 tons in 1947 to 512 tons in 1948.

Production in Morogoro has increased from 265 tons to 644 tons per annum in the last five years.

The Southern Highlands production from which supplies are sold on contract to the Overseas Food Corporation increased from 260 tons in 1947 to 966 tons in 1948.

Experimental growing of vegetables at Mahiwa, Southern Province was carried out successfully in two separate areas. Valley bottom lands are used during the dry season and land above flood level during the rainy season.

*Citrus.*—The Muheza citrus industry had a successful year. A fairly large crop was marketed and the production of fruit and juice was higher than last year. The price paid to growers was Shs. 8/10 per 1,000 oranges. A comparison of production and prices since 1944 is as follows :—

PRODUCTION

| Year | Orange Tons | Juice Gallons | Price per 1,000 Shs. Cts. |
|---|---|---|---|
| 1944 | 1,612 | — | 5 41 |
| 1945 | 1,496 | — | 6 81 |
| 1946 | 1,184 | — | 6 32 |
| 1947 | 793 | 3,020 | 6 47 |
| 1948 | 1,546 | 16,390 | 8 10 |

## SECTION II.—WORK OF THE DEPARTMENT OF AGRICULTURE

### Details of Assistance and Progress of Field Extension Activities

In further pursuance of the departmental policy the department was organized with a Provincial Agricultural Officer in each Province for administrative and field extension activities. The report of each Provincial Agricultural Officer is included in Section V of this report and details of the European Staff are given in Appendix I.

Besides sixteen Asiatic clerks the following African staff is on the establishment of the department :—

5 African Agricultural Assistants.
9 Coffee Grading Assistants.
108 Recorders (Local Civil Service).
16 Artisans (Local Civil Service).
443 African Instructors (Local Civil Service).
505 African Instructors (Food Production Staff).
30 Laboratory Assistants (Local Civil Service).
49 Overseers (Local Civil Service).
21 Motor Drivers, (Local Civil Service).
40 Clerks (Local Civil Service).
44 Messengers.
28 Instructors (Local Civil Service, Copra Industry).

The following is a summary of the progress in each Province :—

### Eastern Province

In reviewing the general trend of agriculture in the Eastern Province there are definite signs of progress taking place. Tractor ploughing for Africans in the Rufiji, increased vegetable supplies from Morogoro, expanding production in the sleeping sickness settlements of Ulanga, the Kilangali and other

furrow irrigation schemes in Kilosa, an improvement in the conditions of coconut plantations in Uzaramo and Bagamoyo Districts extensive vermin destruction in Mafia and other districts, the greatly increased demand for cotton seed in Ulanga and the effort which the sisal industry is making to produce food for labour requirements all augurs well for a very marked increased production throughout the Eastern Province in the very near future.

With the aid of £1,000 granted from development funds a pilot scheme for tractor ploughing was launched in the Rufiji Valley. A total of 700 acres was ploughed during the year.

Two square miles of fertile alluvial land were brought under irrigation in Kilosa District by extensions and improvements to existing furrows. A new furrow will enable a large expanse of the Mkata plains to be utilized particularly when dry season preparation of the land can be carried out by mechanical means. When fully established the irrigation schemes will contribute considerably towards the production of rice and maize in the district.

At Morogoro market sales of vegetables showed a forty per cent increase but the industry is capable of considerable expansion, it will however require greatly improved methods of packing and handling the produce in order to avoid the unnecessary wastage that occurs at present.

The sleeping sickness settlements in Southern Ulanga are developing satisfactorily. There has been a steady increase in production which has by no means reached its limit. Cotton production has been more than doubled and is increasing to such an extent that a demand has arisen for a pioneer ginnery.

The sisal estates employ nearly 40,000 labourers and require 8,000 tons of grain annually to feed this force. Sisal estates in Kilosa District are aiming at an increased acreage of maize towards making the industry self-sufficient in a normal season.

### Central Province

Although parts of the Province were suffering from food shortages towards the end of the year the reserves established as part of the grain silo scheme were a reassuring factor.

The number of silos now in existence is 143 of which 39 were built in 1948.

The problems of soil conservation continue to occupy a considerable proportion of the time of departmental staff with the major emphasis on contour banking. During the year a start was made in implementing conservation practices of proper land usage. Manuring must always form part of any soil conservation programme and the manuring campaign was conducted with extra vigour this year and a most notable improvement was obtained in the amount of manure spread. Tie-ridging was pushed strongly in Singida District.

At the end of 1947 a start was made to extend the growing of cassava particularly in those areas such as Manyoni and Dodoma where it has previously proved unpopular. In Manyoni the distribution and establishment

of five railway wagon loads of cassava cuttings imported from the Western Province resulted in many villages having a communal cassava plot which will serve as a nucleus for wide scale extension early in 1949.

### Western Province

Although the 1947/48 season was below the exceptionally good 1946/47 season it was by no means a poor season except for paddy in Nyamwezi. The most outstanding increases in production were maize in Mpanda District, the palm kernel trade in Kigoma and the development of tobacco in Kibondo.

The African instructors concentrated on implementing the policy of increased production without reduction of fertility. To this end they pressed for full use of available manure, anti-erosion measures and destruction of weeds and vermin, early and close planting, rotation and other good farming practices.

Further progress has been made in Tabora and Kahama Districts in the making of dams for irrigating rice land during dry spells in the wet season. The Rice Mission were particularly interested in these small dams made to irrigate rice fields.

A scheme to reduce the over-prolonged flooding of the Luitche Delta is being supported by the Kigoma Native Treasuries. This delta is a highly productive area largely useless in recent years due to overflooding.

Considerable progress was made in building at the Mwanhala Agricultural Development Centre. Sites were selected for Agricultural development centres at Sumbawanga and Kahama. Very successful agricultural shows were held at Nzega and Kahama.

### Lake Province

The year has been chiefly notable for the second largest yield of cotton. Food supplies were sufficient. There was a poor return from Arabica coffee in Bukoba because of adverse climatic conditions at blossom time but Biharamulo produced a record crop of 246,400 lb. of fire-cured tobacco.

Progress on the improvement of seed supplies is satisfactory. The purification of rice seed supplies continues and 400 tons of pure "Kahogo" paddy was marketed. 188 tons of UK46 cotton seed was produced and distributed at the end of the year to the whole of the Mwanza Zone. Sufficient seed of UK46 should be available to supply the whole of Sukumaland either in 1950 or 1951.

The Sukumaland development team gave special assistance in testing out tractors and implements with a view to ordering suitable equipment for cultivation purposes and the construction of rice dams.

Useful ploughing demonstrations were undertaken by the African Agricultural Assistant in North Mara at twenty-five different centres. The Agricultural Officer, Bukoba, is aiming at one coffee demonstration plot per village. Spacing, mulching, regeneration, handling and pest control are each essential to coffee production yet the failure of any one measure is enough to spell failure for all the others. One of the main difficulties is to get the African growers to apply all these measures annually during the period that will give the best advantage.

The Ukiriguru Experimental Station continues to provide practical advice as to improvements which are possible in local agriculture and very close contact is maintained between the field and the station staff.

There has been a steady improvement at the Kkiruguru Instructors training school under the new Headmaster and there is a better spirit among teachers and pupils alike. Fifty-three men completed their course in September.

In the past contact with the African cultivator has been rather superficial but by the end of the year there was an agriculturalist in each district of Sukuma and as new officers become accustomed to conditions a closer approach can be made to the cultivators.

### Southern Highlands Province

Good progress is recorded in African and estate agriculture during the year. Crop yields were excellent and prices satisfactory. Food supplies were adequate in all areas and food for labour requirements met.

Wheat growing by Africans is on the increase in the Iringa and Mbeya Districts and wheat is becoming popular as a food. Good crops of European potatoes were harvested with little evidence of blight.

There was a marked increase in non-native tobacco production. The variety "Ehlers" introduced last year was practically solely grown in 1948 and produced excellent results. This variety, a heavy yielding type, is suitable to the soil types and altitude of Iringa District. The crop was successfully marketed but with increasing production and the type of tobacco grown marketing is likely to become a problem in the future.

A process of separating the achenes from pyrethrum flowers has created considerable interest in pyrethrum circles and the results of marketing the product are awaited with considerable interest.

Tea production showed a small increase, rainfall being the limiting factor.

### Northern Province

Crop yields in general were below average but increases in acreage more than made up the deficiency, and surpluses, particularly in maize, created new records.

The posting of the Senior Agricultural Officer, Soil Conservation, to Arusha has stimulated a great interest in land usage among estate owners. The presence of the soil conservation section has also been of great value in advising on native soil conservation problems which on congested areas like Kilimanjaro, Meru and Mbulu are serious and pressing.

The scheme for the rehabilitation of Mbulu District does not come directly under the control of the Agricultural Department but staff has assisted with the work of the team which is engaged on relieving pressure on the land. African instructors have been trained and work has been started on putting up contour banks across cultivated land.

The scheme for the improvement of furrows in the Moshi lowlands with a view to preventing wastage of water was commenced in July under supervision of an officer of the Water Development Department. Later the work was taken over by an Agricultural Assistant working under the supervision of the Agricultural Officer. Twelve furrows were completed during the year.

Nineteen of the twenty farming units at Oldeani have been allocated and twelve are already in occupation.

Selected coffee seed from the Coffee Research Station, Lyamungu, planted at five of the Moshi Native Coffee Board's propagating centres is doing well except at one centre. The trial of mother trees and clonal material planted at two centres is progressing fairly well. The Coffee School at Lyamungu was officially opened in January when the first two-year course commenced. One hundred and eighty-five deciduous fruit trees were introduced from South Africa and planted at the Moshi Native Coffee Board's propagating centres on Kilimanjaro.

A very successful Agricultural Show was held at Arusha in November. The entry of African produce from Moshi District was good and the handicrafts from Arusha and Mbulu Districts took many first prizes. Estate produce was of a high standard and Government displays proved popular and instructive.

### Tanga Province

The drive for food planting was got under way early. The excellent rains combined with the efforts of all concerned contributed to the province producing for itself a full year's supply. The estates produced a third of the needs and the African producers of Handeni and Korogwe Districts were responsible for the rest. Tanga Province produces over fifty per cent of the total sisal production of the Territory and the average labour force working on sisal is approximately 64,000 men.

The two major development projects in this Province are progressing well. The Mlalo rehabilitation scheme which has been in progress since 1946 proceeded with a firm backing from the Provincial Administration. The village survey should be completed in 1949. The object of this scheme is to collect data from the village survey to formulate a long-term policy for the future and to demonstrate land utilization and improved village life in a defined area.

A survey of the Luengera Irrigation Scheme was completed and a small pilot furrow is now working.

Testing of varieties of potatoes for resistance to Irish blight continued. All varieties tried in 1948 succumbed to blight but a new consignment of blight resistant seed potatoes was received from Scotland for further trial.

A great deal of activity took place throughout the year by all departmental staff in the Tanga and Pangani Districts to encourage the clearing up of coconut plantations. The Gombero coconut scheme designed to become a co-operative organization for buying coconuts and copra manufacturing was initiated towards the end of the year.

### Southern Province

Following the exceptional harvest of 1947 there was a carry over of large quantities of produce to 1948 this in turn enabled considerable quantities of cassava to come on to the market and a total of 14,052 tons were exported. Cassava is particularly suited to the light sandy soils of the Makonde Plateau

and over 12,000 tons of the quantity marketed was from Newala District. Another important product of the light soils occurring over much of the coastal belt of the Southern Province is the production of cashew nuts. There has been a marked increase in planting of cashew trees following the demand for this product. Tobacco production in Songea District was the second largest on record and growers have announced their intention of growing still bigger acreages in 1949. Game and vermin take far too high a toll of crops in the Southern Province, wild pig and baboon being the worst offenders but the event of major importance was the occurrence of a plague of rats that had multiplied enormously because of the plentiful food supplies. A poisoning campaign was carried out with considerable success in October, November and December.

Good progress was made with further development of the Mahiwa rice station. An important recent development at this station is work on vegetable growing.

*Coffee Research and Experimental Station, Lyamungu, Moshi*

The Annual Report of the Coffee Research and Experimental Station is published separately following the usual custom.

The Senior Research Officer in his interim report states that :—

"After the heavy crop in the 1947-48 season it was only to be expected that a smaller crop would result in the 1948-49 season. Nevertheless, some 25 tons of parchment coffee were sent to the mills. It is gratifying to record that a Class 1 was obtained for eighty-three per cent of one consignment of 3½ tons parchment, while Class 2 was awarded to eighty-seven per cent of the remainder of the main season pickings (17 tons parchment).

"The number of plot and tree samples from experiments for analysis was greatly increased, a total of 3,410 samples being taken for the season.

"Some re-organization of the work on vegetative propagation was undertaken, and the list of selections from which the clones for propagation are chosen was revised. In addition, experiments to improve the technique of rooting cuttings were resumed after a lapse during the war years. Type and position of basal cut, preparation of material, rooting media, and control of light, temperature, and moisture were among the problems receiving most attention. High mortality after rooting continued to be serious, and the matter is still under investigation. 19,202 cuttings were rooted during the year.

"This year, in the experiment where the single and multiple stem systems are compared, single stem has out-yielded multiple stem, though over a period of eleven years the multiple stem system maintains its superiority, yielding fifty-seven per cent more crop. The indications are that the multiple stem system generally gives higher percentage of Grade 'A' beans and out-turn (clean coffee to cherry), whereas single stem usually gives a higher percentage of peaberry and a heavier bean.

"In Experiment V comparing the effects of mulch, compost and sulphate of ammonia all materials have this year generally decreased yields when applied in combination, though increases at varying levels are shown for each when applied in the absence of the other two. Over a seven-year period, all materials have generally caused increased yields in the absence of the other two. In combination, sulphate of ammonia has usually decreased yields, while mulch and compost have generally led to increases in yield, especially at the lower levels.

"Sulphate of ammonia has also increased yield this year in the absence of mulch in Experiment XIVa, where different mulching materials are compared, but here the results over a seven-year period show it to be ineffective. When applied in addition to the mulches, the depressing effect is generally maintained. Banana trash showed increased yields over other materials including compost, and shows itself slightly superior to Guinea Grass over a perod of seven years.

"Only two years yields are available from Experiment VI, where sulphate of ammonia, nitrochalk, and ammonium nitrate are applied at different times of the year and in varying quantities. No comments can be made. The times of application are, however, being modified, in view of the poor response to sulphate of ammonia in other experiments.

"For the second time only in seven years, irrigated plots showed a decrease in yield compared with non-irrigated plots during 1948. Mulch however, increased yield both on irrigated and non-irrigated plots, the higher level (80 lb. per tree) this year being more effective than the lesser (40 lb.). The mean of seven years is generally unaffected, the lighter applications of mulch and irrigation maintaining their superiority. Unmulched plots which had received regular irrigation treatments showed symptoms of yellowing while the crop was maturing, and during the subsequent hot season: such symptoms were not discernible in the mulched plots.

"In the experiment comparing clones and seedlings, seedlings have this year out-yielded clones, and the latter now maintain only a slight superiority over a four-year period. Missing trees render this experiment somewhat unsatisfactory, and it is intended to repeat it as soon as possible.

"Some of the later plantings in the clonal selection trials came into bearing for the first time, yields were generally satisfactory. Liquoring reports on the whole have have been good, N.39 being consistently outstanding in this respect.

"D.D.T. spraying against antestia and thrips was carried out over the whole station."

*Sisal Experimental Station, Mlingano, Ngomeni*

A full Annual Report of this station is published separately. The Senior Research Officer in an abridged annual report on the Sisal Experimental Station for 1948 reports that :—

"This station is now financed entirely by the sisal industry. The previous staff of two officers was augmented by one Agricultural Assistant, while later in the year a Plant Physiologist was appointed under the new scheme for expanding sisal research. Another Agricultural Assistant was posted to Mlingano for six months to help with citrus propagation and other work.

"The station experienced a good season. The total rainfall amounted to 50·5 inches which was well distributed over 165 days and the small rains were heavier than usual. Sisal grew at a satisfactory rate throughout the year and other crops did not become parched.

"Ten of the earlier field trials, some of which date back to 1936, were continued and five new experiments were planted during the year. In addition the station was responsible for conducting four large trials on outside estates. These trials deal mostly with the cultivation, spacing, cutting and manuring of sisal but others are concerned with planting methods, ridging, manuring of bulbil nurseries and the use of insecticides for protecting young sisal against damage by weevil.

"The second-cycle sisal under the clean weeding treatments in the cultivation trial poled out during 1948. A comparison of the final results of the first and second cycles shows that the total number of leaves grown per plant declined from 220 to 200 per plant in the second cycle. The number of leaves cut per plant likewise fell from 190 to 160; this difference was greater due to higher losses of the earliest leaves brought about by slower growth during the young stages. The leaf obtained from the second cycle sisal was also lighter and had a lower content of fibre than that of the first cycle sisal which was planted on virgin land. The net result was a decline in total fibre yields of the order of three tons per hectare. This largely reflects deteriorating soil

conditions of which there is further evidence in other plots where the sisal shows symptoms of deficiency diseases. It is not yet possible to compare the yields of the other treatments having various degrees of a soil cover because the sisal has not grown so quickly and consequently has not yet poled.

"Another trial started in 1944 to test the inter-cropping of soil restorative crops in young sisal (planted in widely spaced double-rows) has so far not shown any significant differences in fibre yields between plots kept clean by frequent disc-harrowing and those having a strip of a recumbent leguminous cover crop. Interplanted elephant grass, cut periodically for mulching, offered severe competition to the sisal which has led to much lower fibre yields to date.

"The results of the original spacing trial, incorporating eight different plant populations ranging from 1,666 to 10,000 plants per hectare, showed a high positive correlation between total fibre yields and plant density during the first cycle. Only sisal planted at densities below 4,000 plants per hectare have poled out in the second cycle; these treatments indicate a similar trend but fibre yields were slightly higher owing to the first cutting taking place earlier in the life cycle of the sisal.

"A complex experiment combining various spacing and cutting methods was concluded during the year. The final results have confirmed once more that the total yield of fibre obtained is mainly dependent upon the population of plants per hectare. The actual spacing adopted appears to be inconsequential as a factor affecting yields for there were no significant differences between the single-row and double-row systems of planting. The time when the cutting of sisal begins was shown to be important since early commencement of cutting, or at two years from planting out in the field, gave a considerably higher yield than when the onset of cutting was deferred until three years. On the other hand frequency of cutting, assuming heavy cutting is not practised, had little bearing upon ultimate fibre yields except that a long cutting cycle (fifteen months) resulted in some diminution of crop. Interactions between these spacing and cutting factors were not significant.

"Other trials demonstrated that excessive mutilation of planting material, particularly trimming the leaves severely, stunts development during the first year, while heavy and frequent cutting of young sisal which is approaching the bearing stage has a dwarfing effect. Sisal grown on ridges has not at present shown any superiority in development over that planted on flat land.

"A factorial manurial trial embodying all possible combinations of nitrogenous, phosphatic and potassic fertilisers each at three levels, also ended during the year. The final results showed no significant differences although at one stage this trial pointed to a response to nitrogen which did not, however, prove to be long-lasting.

"An external fertiliser trial, sited on land where the previous crop of sisal suffered badly from 'banding disease', had demonstrated that disease symptoms may be greatly reduced by application of potash.

"A trial testing the effectiveness of benzene hexachloride and D.D.T. for protecting newly planted sisal from weevil damage proved inconclusive. Benzene hexachloride applied to the bases of plants appeared to delay root formation or 'striking' while strong dusting powders scorched the leaves.

"Nearly 4,500 citrus trees were propagated during the year and sold to sisal estates and others."

*Ukiriguru Experimental Station and Lubaga Sub-station*

This station is under the control of the Chief Scientific Officer, Empire Cotton Growing Corporation whose Headquarters are at Ukiriguru. The Lubaga Farm, Shinyanga, has been used for sub-station work only. The Senior Scientific Officer, Empire Cotton Growing Corporation and the Botanist, Agricultural Department are also stationed at Ukiriguru. The management under control of the Empire Cotton Growing Corporation experimental work is mainly devoted to cotton, fertiliser trials and soil management under the control of the Empire Cotton Growing Corporation Officers. The Botanist has taken over the food crop work, mainly on rice, millets, cassava and other food crops.

The Chief Scientific Officer in summarising the work of the station for the year reports as follows in his Progress Report for the season 1947-48 :—

"The run of cotton yields at Ukiriguru, on parts of Lubaga, and at some of the District Extension Plots were very good.

"Plans are under consideration for raising the production of cotton from the Lake Province, by improved cultivation methods, and a testing of mechanization.

"On the hill-sands, second and fourth year benefits in cropping from rest under elephant grass, were mainly nil. Rest under pigeon-pea, and under cassava allowed to go weedy, showed small but significant second year responses in cropping. On the black loam, the post grass benefit was small but still present in the third year.

"Responses from compost and farm-yard manure were, as usual, big and with a marked residual effect on the Ukiriguru hill-sands and on the not dissimilar soil of the District Plot, Butulwa; and small on the Lubaga black loam.

"At Ukiriguru in an N.P.K. trial on a heavy yielding cotton crop, the effects of N and P although comparatively small were significant.

"On Ukiriguru the yields from good ridges tied compared with poorer ridges not tied were up to twenty per cent higher for cotton, more for maize; and tie-ridging as contrasted with flat cultivation led to yield increases varying from small to very large on Lubaga.

"The multiplication of UK.46 reached around 200 tons of seed. UK.48 was issued for first multiplication, a mixture of 5/57, 6/29, 6/44 and 6/318. UK.46 showed a general improvement in yield over MZ.561, and the constituents of UK.48 an improvement over UK.46.

"Insect damage was light. Blackarm was widespread, and damage was fairly general."

The programme of work in progress for the season 1948-49 includes land resting trials, manurial trials, testing the value of ridging in various forms with superimposed on this the value of tying. Cotton selections continues along the lines of the past few years and the search for better blackarm resistance will continue.

The Botanist's Report on food crops for the 1948-49 season is included in Section V of this report.

Cotton Experimental Station, Ilonga

This station was in charge of a Senior Scientific Officer, Empire Cotton Growing Corporation, during the year and the main experimental work

consisted of variety and strain trials. Entomological problems on cotton figure largely in the work of this station and the usual routine of the incidence of insect pests and plant development was carried out at Ilonga and on the district plots. An insecticide trial at Ilonga showed that it was possible to reduce very considerably the damage caused by American bollworm by the use of D.D.T. and Gammexane dust. A fertiliser trial with maize including two treatments with silicophosphate at the rate of 200 and 400 lb. per acre, potash and sulphate of ammonia was undertaken. The effect of nitrogen was significant but no differences were obtained with phosphate and potash.

The testing of strains and selection work continues and two insecticide trials will be undertaken in the programme of work for the 1948-49 season. One at Ilonga designed to test the number of applications necessary for protection at economic rates and one on an adjoining estate to test the effect of different dusts and the minimum number of applications on a commercial scale.

### Mwanhala and Tumbi Agricultural Development Centres

The Provincial Agricultural Officer, Tabora, in his report on the above stations reports that in addition to erection of buildings, clearing land and road making with funds from Development votes, the Nzega Creameries Board has provided money for the development of a stock farm in conjunction with the Mwanhala Agricultural Development Centre.

The area planted to crops at Mwanhala amounted to 90 acres and at Tumbi 69 acres.

Most of the crops grown were sold as seed to Africans who are now showing keenness to obtain seed from the station. Most popular are paddy, pulses, sunflower and the pig-resistant cassava "Liongo" of which big quantities of cuttings were distributed.

A résumé of the results of the experiments is given as follows :—

*Tumbi.*—A crop of maize was taken from all plots after three years under elephant grass, pigeon pea or continuous maize (control). All the fallow treatments were significantly superior to control but there were no significant differences between treatments.

The sodaphosphate experiments at Tumbi and Mwanhala showed that both single and double dressing of phosphate gave a significant increase over control. At Tumbi there was no significant increase in yield due to sulphate of ammonia nor to sulphate of potash. Sulphate of ammonia by itself at Mwanhala gave no significant increase but a marked increase in yield when mixed with soda phosphate. Sulphate of potash by itself and with a single dressing of soda-phosphate increased yields significantly.

This year the third residual year in the manurial compost and rock phosphate trial both single and double dressings of compost and rock phosphate gave increases in yield over control which were just insignificant.

An experiment to test the effect of D.D.T. dust and gammatox solution applied in the funnel of maize had no significant effect on stalk borer infestation either at Tumbi or Mwanhala. A similar trial at Ussanga Chiefdom was also inconclusive.

*Lushoto Farm.*—The main work at Kunguli Farm, Lushoto, is the testing of potato varieties resistant to Irish blight (Phytophthora infestans). These varieties have been obtained from the Scottish Plant Breeding Station,

Corstorphine, whose good offices are gratefully acknowledged. In 1948 August plantings and in later September and October plantings all varieties including all those that had been free of P. infestans since first importing in 1945 succumbed to P. infestans and another blight strain appeared. Specimens were sent to Corstorphine and the strain has been named "E" and so far it is apparently located in the Usambaras only. New varieties of potatoes bred for resistance to strain "E" of Irish blight are in the course of being bred at Corstorphine and shortly the blight resistant testing work will recommence. During the year Dr. W. Black, Plant Breeder from the Scottish Plant Breeding Station visited Lushoto to advise on the varieties of potatoes he had bred for testing.

*Morogoro Farm.*—Work on the farm was concentrated on the maintenance of varieties of crops including cassava, sweet potatoes, maize, sorghum and bananas, the preparation, sale and distribution of planting material and the supply of fresh milk.

The demand for budded fruit trees was heavy and 7,045 plants were supplied. Of this toal 6,547 plants were citrus, 1,561 other fruit trees and 1,918 ornamentals.

The citrus nurseries were extended and a new area has been opened up to replace the old nursery which has been in use for ten years.

A trial with silicophosphate undertaken for the East African Fertilizer Team was carried out for the second year. In the first year the result was not significant but in the second year the nitrogen with addition of potash gave a significant difference in yields of maize.

Cassava variety trials were continued. Three varieties remained free from brown streak of cassava.

*Mahiwa Rice Station.*—Selection of high yielding strains continues and four selections which have given consistently high yields are being multiplied. A trial is in progress to find out the best treatment of rice lands after the rice is harvested and before the next crop is sown. The ridging of rice lands for dry season crops which have given such good results in Zanzibar is being tried at Mahiwa where all dry season crops are grown on the flat.

Oxen have been acquired for cultivation of rice lands and since their use cultivation costs have been reduced considerably.

Considerable progress was made with vegetable growing trials and a system has been introduced with success to produce vegetables during the rains on land immediately above flood level and during the dry season on valley bottom land.

*Mbosi Coffee Sub-Station.*—Coffee variety trials are in progress at this station under the supervision of the Chief Scientific Officer, Lyamungu. This station serves the Southern Highlands coffee areas of Mbosi near Mbeya and as a sub-station of the Coffee Research and Experimental Station, Lyamungu.

Apart from the experiments and trials at the large-scale experiment stations, sub-stations and Agricultural Development Centres various experiments and trials are in progress in the Northern and Southern Highlands Provinces of which the following is a brief summary.

### Southern Highlands Province

*Linseed.*—Very encouraging yields were obtained from the trials with the Punjab variety. Yields varied from 270 kgs. to 604 kgs. in the Mbeya District

and from 108 kgs. to 239 kgs. in the Njombe District. The trials will be continued and will include Rio and Royal varieties, seed of which has been obtained recently.

*Tobacco.*—Ten varieties of tobacco seed were planted for trial at Mloa. Transplanting will be done early in January, 1949.

### Northern Province

Trials carried out on a new series of wheats bred for short season conditions indicate that two of the varieties are likely to be of value in replacing some of the varieties at present grown. Included in the trials were three strains of "249" and one of "261" of these only "294 B 2 A 3" is likely to be of value, the other three being susceptible to rust damage.

Experiments are being conducted in the Ol Motonyi areas to discover the effect of manganese on coffee.

### Soil Conservation

Proposals for the furthering of soil conservation work in the Territory were approved early in the year. Expenditure was authorized from the 1st September from Colonial Development and Welfare Funds to establish a Soil Conservation Centre for training staff on soil conservation work.

Tengeru near Arusha was selected as the most suitable site and towards the end of the year definite progress was made in obtaining the land and formulating plans to develop the centre.

Two Agricultural Assistants were transferred to Arusha for soil conservation duties and with the arrival of some of the mechanical equipment recruitments of the African staff were made and training started for grader operators and surveyors.

The Senior Agricultural Officer, Soil Conservation, visited a number of areas in the Territory both where schemes under the Development plan were being carried out, and other areas requiring treatment and assistance with surveys and in the planning of land use.

The following areas were visited by the Senior Agricultural Officer, Soil Conservation and recommendations made for modifying or dealing with the problems of soil erosion :

Mbulu District, Northern Province.
Uluguru Mountains, Eastern Province.
Mlalo Basin, Lushoto District.
Kondoa District, Central Province.
Mwanza and Sukuma Districts, Lake Province.
Sisal areas, Tanga Province.

In Arusha District a number of estates were visited and advice given. A considerable amount of work is in sight as soon as the mechanical equipment is obtained.

The work undertaken by the two Agricultural Assistants attached to the Senior Agricultural Officer, Soil Conservation, was limited to surveys and reconnaissance studies in African areas Moshi and Arusha Districts.

The trial and demonstration plots of bench terracing laid down at a number of centres are providing useful information as to the value of this treatment under a range of different conditions.

Reports on a number of crop introductions useful in soil conservation work show some promise for specific areas and multiplication of seed stocks of these is being undertaken.

In the Lake Province an area was selected for survey and layout of a large-scale trial of watershed treatment.

## Fisheries

A Fisheries branch of the Agricultural Department was created in 1948 and two Fisheries Officers appointed during the year. The first officer who arrived in February was posted to investigate fully the fishing industry on Lake Rukwa. This Officer will later eventually be stationed at Kigoma where he will investigate and develop the fisheries of Lake Tanganyika. His duties are primarily concerned with the Lake Fisheries. Details of the investigations are given in the Fisheries Officer's Annual Report quoted in Section V.

The second officer who arrived in December will be stationed at Korogwe, Tanga Province, and his duties are primarily concerned with fish farming. On arrival the second Fisheries Officer proceeded on a tour of the Eastern and Tanga Provinces as a preliminary to formulating proposals for fish farming.

## Publications

Articles sent to the Editor, *East African Agricultural Journal* for publication during the year 1948 were as follows :—

*April Issue:—*

"The Establishment and Running of Pawpaw Plantation", by G. B. Wallace.

"Diseases of Pawpaw and their Control", by G. B. Wallace.

*July Issue:—*

"Ascochyta Blight of Cotton", by Maud M. Wallace.

"Further Note on Onion Experiments on Kilimanjaro", by R. J. M. Swynnerton, M.C.

"Bacterial Soft Rot of Vegetables", by G. B. Wallace.

*October Issue:—*

"Sunflower Production in the Iringa District", by A. H. B. Childs.

"Cotton Ginning in Tanganyika and Comments thereon", by R. I. Butler.

Published by the Moshi Native Coffee Board :—

"All about Kilimanjaro Native Co-operative Union Coffee", by R. J. M. Swynnerton, M.C., A. L. B. Bennett and H. B. Stent.

## Council, Boards and Committees

The Director of Agriculture is a member of Legislative Council and is Chairman of the Cotton Board, the Tea Board, the Coffee Board, the Sisal Experiment Station Management Committee and the Coffee Research Station Board of Management. He is a member of the Sisal Board, the Labour Board, the Seeds Board and the Editorial Board of the *East African Agricultural Journal*, and attends all meetings of the Pyrethrum Board. The Deputy Director of Agriculture served on a number of *ad hoc* committees during the year and the Senior Agricultural Officer (Headquarters) continued to represent the Department on the Tanganyika Industrial Committee.

## SECTION III.—FINANCE

The financial provision for the period from 1st January, 1948 to 31st December, 1948, was £215,090 while actual expenditure was £238,005 details being shown in Appendix IV.

The Empire Cotton Growing Corporation continued to meet the Personal Emoluments of four Empire Cotton Growing Corporation Officers posted to this Territory for cotton investigations, and the salary of one Ginnery Inspector amounting to £700 was again provided by the British Cotton Growing Association. The financial assistance afforded by the Councils of the above two bodies is again gratefully acknowledged.

The Agricultural Development Fund provided £141,246. The total expenditure incurred in 1948 amounted to £49,307 as it was not possible to begin work on all projects during the period. Details are given in Appendix V.

The following are the estimates of direct revenue secured by the Department in 1948, compared with revenue collected during the previous two years :

| | 1946 | 1947 | 1948 |
|---|---|---|---|
| | £ | £ | £ |
| Bukoba Coffee Grading Fees ... ... | 2,208 | 1,831 | 1,142 |
| Sisal Tax ... ... ... ... ... | 22,326 | 58,234 | 160,538 |
| Coffee Tax ... ... ... ... ... | 4,627 | 6,842 | 5,340 |
| Cotton Tax ... ... ... ... | 2,222 | 4,087 | 5,420 |
| Pyrethrum Tax ... ... ... ... | 749 | 661 | 271 |
| Tea Tax ... ... ... ... ... | 794 | 685 | 645 |
| Total ... | 31,926 | 72,240 | 173,356 |

In addition to the provision made under Departmental Head and Agricultural Development Funds, the following provision for services connected with "Agriculture" were made in the Territorial Estimates for 1948 :—

| Head and Sub-Head | Provision from 1.1.48 to 31.12.48 | Expenditure from 1.1.48 to 31.12.48 |
|---|---|---|
| | £ | £ |
| *Subsidization and Temporary Bonus* | | |
| Guaranteed Minimum Returns ... ... ... ... | 1,500 | 4,881 |
| *Subventions* | | |
| Imperial Agricultural Bureax ... ... ... ... | 1,290 | 1,287 |
| Imperial Institute ... ... ... ... ... ... | 400 | 400 |
| Imperial College of Tropical Agriculture, Trinidad | 1,500 | 2,900 |
| Coffee Section of the British Empire Producers' Organizations ... ... ... ... ... | 155 | 152 |
| East African Agriculture and Forestry Research Organization ... ... ... ... ... | 4,050 | 3,875 |
| East African Anti-Locust Directorate (Desert-Locust) | 25,000 | 12,286 |
| Grant to Sisal Board ... ... ... ... ... | 33,067 | 148,848 |
| Grant to Coffee Board ... ... ... ... ... | 8,280 | 10,558 |
| Grant to Pyrethrum Board ... ... ... ... | 5,910 | 272 |
| Grant to Tea Board ... ... ... ... ... | 930 | 645 |
| *Loans from Territory Funds* | | |
| Agricultural Crop Loans ... ... ... ... ... | 15,000 | 23,918 |
| Agricultural Machinery Loans ... ... ... ... | 15,000 | 57,903 |
| Loans for Grain Storage ... ... ... ... ... | 5,000 | — |
| Loans for Soil Conservation ... ... ... ... | 5,000 | 970 |
| | 132,082 | 268,895 |

*Natural Resources.*—(Ordinance No. 30) Natural Resources Ordinance, 1948. An Ordinance was enacted to ensure that the natural resources of the Territory are conserved. Under this Ordinance a Natural Resources Board is to be constituted and provision is made for the appointment of Conservation Councils. The Member for Agriculture and Natural Resources, with the approval of the Board may construct and maintain conservation works on any land. The Ordinance makes it an offence to cause damage to another person's land by discharging storm water and provision is made for destocking and limitation of stock.

*Coffee.*—(Ordinance No. 8) Coffee Industry (Registration and Improvement) (Amendment) Ordinance, 1948.

This Ordinance provides for the appointment of eight unofficial members to the Coffee Board of whom four shall be nominated by the Tanganyika Coffee Growers' Association, two by the Moshi Native Coffee Board and two by the Bukoba Native Coffee Board. This Ordinance is a result of a recommendation by the Coffee Board which considers that the interests of African producers should be represented.

(Ordinance No. 44) Coffee Factories (Amendment) Ordinance, 1948. This Ordinance amends certain definitions of coffee so as to provide for the better control of the operations of coffee curing and hulling factories.

(Ordinance No. 50) Coffee Industry (Registration and Improvement) (Amendment) (No. 2) Ordinance, 1948. This Ordinance was enacted to make it a condition of a dealers licence that he shall not store any coffee which is not dried coffee. Opportunity is also taken in this Ordinance to introduce a section which confers general regulation making powers and to revise the penalty section.

Government Notice No. 37. An order under the Native Coffee (Control and Marketing) Ordinance, 1937, and cited as the Native Coffee (Compulsory Marketing) (Moshi) Order, 1948, was enacted making it compulsory for all producers of native coffee in the Moshi District to sell such coffee through the agency of the Kilimanjaro Native Co-operative Union Ltd.

*Cotton.*—Government Notice No. 35. Rules cited as the Cotton (Cotton Board) Rules, 1948, revoke the following rules and prescribes new rules :—

The Cotton (Cotton Board) Rules, 1937.
The Cotton (Cotton Board) (Amendment) Rules, 1939.
The Cotton (Cotton Board) (Amendment) Rules, 1946.

Government Notice No. 148. An Order made under Regulation 4 of the Defence (Sale of Cotton to India : Eastern Province) Regulations, 1944, cited as the Defence (Sale of Cotton to India: Eastern Province) (Variation) Order, 1948, varied the price.

*Pyrethrum.*—Government Notice No. 180. An Order cited as the Pyrethrum Industry (Levy) Order, 1948, revoked the Pyrethrum Industry (Levy) Order, 1947, and imposed a schedule of levies upon all Pyrethrum grown and exported from the Territory as follows :—

| *Amount of Levy* | | *Area* |
|---|---|---|
| 1 cent per lb. | ... | Northern Province. |
| 3 cents per lb. | ... | Southern Highlands Province. |
| 1 cent per lb. | ... | Elsewhere in the Territory. |

*Sisal.*—Government Notice No. 120 rules cited as the Sisal Industry (Registration) (Amendment) Rules, 1948, amended the rules referring to Annual Plantation Returns, Monthly Returns and Registration mark.

*Land Bank.*—Government Notice No. 175 brought into operation The Land Bank Regulations, 1948.

*Seed Production.*—Government Notice No. 155. An Order, The Export Seeds Ordinance, 1947, cited as the Export Seeds (Fumigation and Marketing) Order, 1948.

Government Notice No. 158. An Order cited as the Export Seeds (Levy) Order, 1948, imposing a levy on all exports above 1 lb. weight according to the published schedule.

*Tobacco.*—Government Notice No. 82. An Order cited as the Non-Native Tobacco Industry (Levy) Order, 1948, providing for a levy of sixteen cents per lb. in respect of all tobacco produced in the Southern Highlands Province which is intended for sale and which has been graded, packed and marked in accordance with the Non-Native Tobacco Industry Ordinance, 1941.

Government Notice No. 44 cited as the Nyamirembe Native Tobacco Board (Establishment) Order, 1948, was enacted to establish the Nyamirembe Native Tobacco Board.

Government Notice No. 145 cited as the Native Tobacco (Compulsory Marketing) (Nyamirembe) Order, 1948, requires all producers of native leaf tobacco in the Biharamulo, Ngara and Kibondo Districts to sell such tobacco to the Board.

*Increased Production of Crops.*—(Ordinance No. 14). Increased Production of Crops (Amendment) Ordinance, 1948. This Ordinance confers on officers of the Agricultural Department not below the rank of Agricultural Officer powers similar to those of a District Committee.

## Conclusion

The thanks of the Department are accorded to members of the Department of all ranks for their continued zeal in the execution of their duties and the help given by the Provincial Administration is gratefully acknowledged. Furthermore it is desired to thank all members of the numerous Boards and Committees that assist in the work of the Department and the progress of agricultural industry.

C. E. J. Biggs,
*Director of Agriculture*

## Eastern Province

### *Climatic Conditions*

In the coastal region the rainfall was satisfactory and excellent crops were harvested wherever growers had cultivated their land at the proper time. In the interior there was exceptionally heavy rain in December, 1947, and in January, and in many areas the ground became water-logged thus prohibiting paddy planting. Luckily February was a dry month, else the position would have been serious indeed. Although this allowed plantings to be carried out, the long rains ceased abruptly in May and a lot of paddy, which was promising well, failed to mature. The necessity for early preparation of the land was thus again clearly demonstrated; for those who were in a position to plant as soon as the rains broke harvested good crops, whilst dilatory cultivators were heavily penalized. Where bumper crops had been harvested in 1947 there was a marked tendency for cultivators to postpone preparation of the land until the main rains had actually broken. Having planted late they harvested little or nothing owing to the early cessation of the rains.

### Agricultural Instruction and Education

A three-weeks course for twenty-five instructors drawn from all districts in the Province was held during the Christmas vacation at Bigwa Teachers Training Centre, with the assistance of the Education Officer in charge. The underlying theme was "Good Husbandry" and the course included lectures on soil conservation, maintenance of soil fertility, early preparation of the land and control of weeds. Coloured slides depicting soil erosion and soil conservation measures were shown to the classes which greatly appreciated them.

A number of lectures on soil conservation, illustrated by coloured slides obtained on loan from the Senior Agricultural Officer (Soil Conservation), were given to Africans in Morogoro District. The lectures were well-attended and requests have been received for more of these lectures to be given. An interesting result of these lectures was the discovery that coloured pictures convey very much more to an ordinary African audience of cultivators than do pictures in black and white. A picture in black and white depicting sheet erosion in a field of maize conveyed nothing to the audience; but a few moments later when the same picture was presented in colour the response was instantaneous. The importance of colour photography for agricultural propaganda can hardly be over-emphasised, if it is intended for African audiences out in the field.

During the year, with the assistance of the Information Officer, a propaganda film was made depicting the damage caused by the Rhinoceros beetle (*Oryctes monoceros*) and the measures necessary to combat this pest.

The teaching of agriculture continued at Bigwa Teachers Training Centre; but, in the absence of an examination in agriculture at the end of each year, the subject tends to lose its importance in the eyes of the examinees. It is apparent, therefore, that until the teaching of agriculture is included in the curriculum of all teachers training centres and is accompanied by an examination in the subject, it will not receive the attention that is its due.

*Irrigation.*—The Senior Agricultural Assistant, Kilosa, continued the work begun in 1946. Extensions and improvements were made to existing furrows and new furrows were constructed at Lumuma and Kilangali. At Lumuma two square miles of fertile alluvial was brought under irrigation, whilst at Kilangali the new furrow, which taps the Miyombo river, will enable a large expanse of the Mkata plains to be used for rice cultivation, particularly when dry season preparation of the land can be carried out by mechanical means. It is of interest to note that each of these irrigation works in Kilosa District has been undertaken by free communal effort, only the tools and cement being supplied with the aid of funds from the Native Treasury. When fully established the schemes will contribute considerably towards the production of rice and maize in the district, and serve to reduce the land hunger that exists in the vicinity of Kilosa.

*Tractor Ploughing for African Peasants.*—At long last with the aid of £1,000 granted from Development funds a pilot scheme for tractor ploughing was launched at Ndundu, in the Rufiji Valley. A new "Fordson Major" tractor, fitted with pneumatic tyres, and a six-foot harrow-plough were purchased and operations began in July. Initially, work was held up owing to the inability of the harrow-plough to cope with the exceptionally tall and tough dry grass stems. After the grass had been burned the harrow-plough did excellent work. Further delay was caused by damage which the plough received in transit to the Rufiji. Initially, the object was to plough as much land as was possible with the funds available after the purchase and transport of the tractor and plough. A total area of 550 acres was ploughed free of charge in a gross tractor running time of 605 hours, inclusive of time taken going to and from work and halts for replenishing fuel and water, which was estimated to amount to one hour daily. In addition, 150 acres of land were ploughed on payment for a group of individuals who wanted land ploughed near to their homes. The total area ploughed was therefore 700 acres. Ultimately the ploughing rate worked out at 1·16 acres per hour whilst the fuel consumption amounted to 1·82 gallons per hour. The harrow-plough was a No. 3 McCormick-Deering fitted with notched discs, twenty-six inches in diameter and spaced ten inches apart. Under dry conditions where the soil is not too hard and the grass not excessively tall and tough this harrow-plough does excellent work. It was necessary to add weight to the plough on hard ground and where the vegetation was too tough and thick a disc plough would have been preferable. The plough was adjusted to plough a strip five feet wide to a depth of five inches. The tractor, when fitted with 300 lb. wheel-weights on each rear wheel and water-ballasted tyres, was able to pull the plough in second gear. It is considered that neither the harrow-plough nor the tractor are heavy enough to deal with the heavier clay soils encountered in various parts of the Rufiji Valley and somewhat heavier equipment will be used next year. This is no reflection on the equipment used this year which fully achieved what was expected of it. It is apparent, however, that the cost of transporting fuel for considerable distances by road necessitates the employment of diesel-engined tractors. Also on hard ground wheel-spin occurs resulting in undue tyre wear. Four "Fordson" tractors fitted with half-tracks and Perkins diesel-engines have been ordered for next season's operations, in conjunction with Massey-Harris "505" five-furrow disc-ploughs.

The cost of the ploughing worked out at approximately Shs. 17/50 per acre owing to the small acreage which it was possible to complete this season. By using a team of diesel-engined tractors working over a longer period it is estimated that the cost can be reduced to Shs. 15/- per acre, provided payment is made in advance, in order to avoid incurring bad debts and payment of interest charges on a loan. Payment in advance may prove difficult to achieve during the first year or two; but it is essential if the cost is to be kept down to Shs. 15/- per acre.

Africans' reactions to the scheme were at first actuated by suspicion of anything new. They suspected that Government might have an ulterior motive in ploughing their land free of charge; but as time went on suspicions were allayed and the land was readily taken up by cultivators. Growers have already discovered that weed growth is much less vigorous on the ploughed land. If, as is anticipated, the yield per acre is also higher, then the scheme should prove a success.

*Seed Distribution.*—The distribution of onion and vegetable seeds on an extensive scale was continued and the expansion in the production of vegetables in Morogoro District was undoubtedly assisted by this means. Improved seed of maize, cowpea, coconuts, cassava, paddy and sweet potatoes was also distributed to Africans and European planters.

*Sleeping Sickness Settlements.*—The earlier settlements in Southern Ulanga are developing very satisfactorily. As originally predicted, the areas demarcated have proved too small and expansion has been necessary. Furthermore, there has been a steady and very satisfactory increase in production which has by no means reached its limit. Cotton production has been more than doubled and will probably be trebled in 1949. The health and general well-being of the people shows a steady improvement. Cotton production has increased to such an extent that a pioneer ginnery is needed at Mwaya.

## Food Supplies

Food supplies were plentiful throughout the Province, except in the Rufiji Valley where the inhabitants were so overcome with the bumper harvest of 1947 that the majority of them ignored all exhortations to start cultivating their rice fields for 1948 until it was too late. This dilatoriness coupled with the early cessation of the long rains proved to be their undoing. No famine relief was necessary but the sales of paddy amounted to ten per cent of the normal output.

Dar es Salaam Township continued to absorb vast quantities of food, much to the detriment of the market returns of Uzaramo District, which is in fact far more productive than market returns would suggest.

Particular mention should be made of the very creditable effort of Bagamoyo District whose famine-prone areas produced 660 tons of maize for sale this year and would have produced considerably more had not the roads become impassable as soon as the short rains broke. In addition, the inland chiefdoms of Uzigua and Ukwere produced a very satisfactory increase in cotton production.

A welcome increase in maize production also occurred in the northern areas of Morogoro and Kilosa Districts. In Ulanga growers were disappointed in the reduced prices offered for maize and sorghum and preferred to convert their surplus grains into beer, as had been predicted.

*Food Crops in Detail.*

| Paddy | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... ... | 6,894 | 780 | 427 | 6,030 | 2,174 |
| Hand-hulled rice tons ... | 890 | 178 | 123 | 414 | 281 |

Weather conditions were not ideal but had growers in the Rufiji bestirred themselves earlier in the season the provincial total would have been doubled. Illicit retail sales of rice reduced the quantity passing through the produce markets in Uzaramo, Morogoro and Kilosa Districts.

*Maize.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Production in tons ... | 8,767 | 4,369 | 1,920 | *12,347 | *9,381 |

(*Inclusive of Estate production).

Weather conditions were somewhat patchy in inland districts but very satisfactory in the coastal districts, particularly in Bagamoyo where the efforts of the Administrative and Agricultural staffs had succeeded in getting the majority of natives to prepare their land in good time. In Morogoro and Kilosa Districts yields were lighter than usual owing to the early cessation of the long rains following on a late onset.

*Sorghums.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... ... | 2,725 | 512 | 103 | 1,333 | 1,095 |

Sales were satisfactory particularly in Morogoro District. A considerable tonnage would have been forthcoming from Ulanga District had it been possible to subsidize the cost of road transport from outlying areas as has been recommended for several years past.

*Mixed Beans.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 900 | 265 | 101 | 341 | 358 |

The quantity of beans sold in the markets is not a true index of production for about two to three hundred tons of beans are estimated to have been bought by sisal estates in Kilosa District.

*Cowpeas.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 224 | 81 | 80 | 298 | 156 |

*Green Gram.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 7 | 169 | 16 | 120 | 70 |

*Pigeon Pea.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 155 | 114 | 22 | 1,925 | 158 |

The 1948 grain totals show a surprising drop after last year's record crop. Prices remained the same but it seems that the season was not so propitious.

*Onions.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 129 | 168 | 153 | 89 | 111 |

Shortage of seed hampered production and this year's issue of seed was very mixed and yielded small bulbs.

*European Potatoes.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 55 | 17 | 222 | 82 | 73 |

Production is unlikely to improve until a "blight-immune" strain of potatoes can be distributed to growers in Morogoro and Kilosa Districts. A small quantity of "blight-immune" seed was obtained from Lushoto towards the end of the year and this is being multiplied at Morogoro Farm.

*Vegetables.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 665 | 724 | 773 | 700 | 844 |

Non-Native production in Kilosa District declined from 300 tons to 200 tons owing to the extension of the area under sugar cane. However, this was more than offset by the increased production in Morogoro District. This is a purely native industry which during the past five years has increased from 265 tons to 644 tons per annum. Good prices have proved an incentive but the most important factor has been the assistance given to growers in supplying them with improved seed at reasonable prices. Seed is purchased in bulk with the assistance of Native Treasury funds and retailed to growers in sealed packets through the African Instructors. A vegetable market has been opened at Mgeta in the Uluguru mountains the popularity of which augurs well for the future of the industry.

*Root Crops.*

| Cassava | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 259 | 1,368 | 155 | 470 | 237 |

Except in the black cotton soil areas reserves of cassava remained satisfactory. Cassava is a staple foodstuff in parts of Bagamoyo, Uzaramo and Rufiji, and the market sales provide no indication of the area under this crop.

## Native Cash Crops

| Cotton | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| 400lb. bales ... ... | 5,100 | 4,780 | 6,224 | 6,631 | 7,205 |

Had production in the Rufiji been normal the crop would have been well over 8,000 bales. It was unfortunate that the increased prices for the 1948 crop could not be promulgated until the planting season was over. The weather in Western Ulanga was unsatisfactory which was a misfortune, as this is a productive cotton region in normal seasons. However, it seems reasonable to prophesy that the 1948 cotton prices have made Africans more "cotton-conscious" and there is reason to believe that a considerable increase in acreage will take place in most zones during 1949.

The price varies from 53 to 59½ cents per kilogram for first grade seed cotton. Growers who had planted at the proper time harvested excellent crops in the majority of instances and were delighted with the price they received. One village headman in Southern Ulanga spent part of his cotton earnings on a trip to Morogoro, which he had not visited since 1913 when he had worked on a rubber plantation and the journey on foot had taken him two weeks. In 1948 he accomplished the journey by lorry and train in two days.

Damage and loss from insect pests was unusually low and the percentage of third grade seed cotton would have been even lower but for abnormally heavy rains in October. The quality of third grade seed cotton was poorer than usual which suggests that growers may have been more careful in sorting their crop.

*Copra.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 4,663 | 5,448 | 4,637 | 2,193 | 4,764 |

The season was a normal one and yields were satisfactory. Thefts were more numerous than ever and the records of nut-yields on the Government plantations at Bagamoyo were spoilt thereby.

*Sesame.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 606 | 523 | 224 | 201 | 355 |

This crop is no longer grown in any quantity in the inland districts, probably due to castor seed proving a more certain and also more remunerative crop.

*Cashew Nuts.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 463 | 347 | 218 | 348 | 661 |

The Mafia crop comes on to the market in December and early in the New Year and sales from the 1947 crop were excellent though the true 1948 crop on Mafia Island was a failure which is likely to be reflected in the 1949 sales. The 1948 crop in Uzaramo, which comes on the market in November and December, was a good one, resulting in an exceptionally good total for the year.

*Arrowroot (Tacca Starch).*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 134 | 153 | 3 | 121 | 82 |

*Beeswax.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 10 | 4·5 | 10 | 6 | 7 |

*Charcoal.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 1,155 | 1,269 | 1,107 | 1,925 | 2,805 |

The increased sales in 1948 are the direct result of the efforts of the Forestry Department in checking illicit sales outside the Native Authority markets.

*Gum Copal.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 65 | 22 | 57 | 59 | 26 |

*Raffia Fibre.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 66 | 67 | 75 | 84 | 21 |

*Castor Seed.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 131 | 268 | 342 | 698 | 850 |

The crop is produced in the drier country in Northern Kilosa and the North-west corner of Morogoro Districts. It is interplanted in the maize fields and ripens after the maize crop has been harvested. It is a valuable source of wealth to the Africans in these areas providing them with an income which amounted to approximately £17,000 in 1948.

*Sunflower.*—During 1948 sales in Native Authority markets reached 117 tons. This is the first year in which the crop has been grown by Africans in this Province and, although seed was distributed on a wide scale, the results were disappointing. Some would-be growers received seed which did not germinate; many recipients of seed preferred to crush it and use the oil for culinary purposes, and in some areas planting was unduly delayed. However, those who were fortunate with their seed and looked after the crop were

pleasurably surprised at the ease with which it is grown and harvested and at the satisfactory prices obtained for their crop. There has been a keen demand for seed on the part of those who did not plant sunflower and growers have been able to retail part of their crop at a handsome profit.

*Vegetables.*

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Sales in tons ... ... | 388 | 322 | 473 | 408 | 644 |

The above figures refer to native production at Morogoro market and do not include a considerable tonnage of vegetables which are believed to be bought from African growers by the Missions and railed to Dar es Salaam. The recent opening of a vegetable market at Mgeta has checked this trade. Vegetable production in Kilosa District is a non-native industry, which has dwindled to about 200 tons annually. At Morogoro market sales showed a forty per cent increase over the previous record crop of 473 tons. This was the result of good weather conditions, good prices and the provision of good seed at wholesale prices. The industry is capable of considerable expansion even to the extent of meeting all the requirements of Dar es Salaam Township but it will require greatly improved methods of packing and handling the produce, in order to avoid the unnecessary wastage that occurs at present.

## Non-Native Agriculture

*Sisal.*—This is the major plantation industry in the Province and during the year under review efforts were directed towards a greater degree of mechanization in field operations. With the arrival of much needed agricultural implements and tractors, stumping, ploughing and weeding have been mechanized to a much greater extent. There is still a great dearth of suitable implements and the saturation point for machinery is unlikely to be reached for some years to come. Production was hampered by shortage of labour and occasional breakdowns of factory machinery, nevertheless the Province produced a record output amounting to 36,375 tons.

These sisal estates employ nearly 40,000 labourers and require 8,000 tons of grain annually to feed this force. In 1947 the estates made a very creditable contribution towards achieving self-sufficiency in their own requirements of maize. During 1948 efforts towards self-sufficiency were less whole-hearted, except in Kilosa District where sisal estates continued their policy of food production for home consumption. One estate produced the remarkable total of 700 tons of maize. For the coming season sisal estates in Kilosa District are aiming at an increased acreage of maize which will make the industry self-sufficient in a normal season. In Morogoro and Uzaramo Districts maize yields per acre are often very poor on the red soils close to the Central Line, and arrangements are being made for sisal estates to lease blocks of land in the Wami Valley for the purpose of food production. The offer has not been confined to estates in Morogoro District only and it is hoped that groups of estates in other districts of provinces will avail themselves of this opportunity of producing their own requirements of maize and pulses. When the sisal industry has attained self-sufficiency in its food requirements it will be possible for the full production of native maize and sorghums to be sold at Dar es Salaam. It should be possible for the Province to produce at least 7,000 tons of maize and sorghum from native markets each year.

*Sugar Cane.*—Although the area under this crop expanded considerably in 1947, approximately half of the cane remained uncut owing to a glut of

"jaggery" and a consequent drop in prices to an uneconomic level. No accurate figures of production are available but it is estimated that the year's crop of jaggery amounted to 1,500 tons.

*Maize.*—The season was a poor one owing to an unexpected drought when the majority of maize fields were tasselling. A minority of lucky planters harvested good crops; but the majority harvested only two to three bags per acre and both Morogoro and Kilosa Districts opted for the payment of the maize acreage grant of Shs. 32/- together with lower price per bag. Payments in maize acreage grants amounted to £26,485.

*Cotton.*—Non-native production of seed cotton in Kilosa and Morogoro Districts during the past three seasons has been as follows :—

| | 1946 | 1947 | 1948 |
|---|---|---|---|
| Production of seed cotton in tons ... ... ... | 597 | 294 | 638 |

Weather conditions were satisfactory and insect damage was less than usual. The lower and middle crops were unusually free from staining though this increased with the later pickings owing to the rainy weather in October and November. Delay in receiving payment for their cotton lint has caused considerable inconvenience to planters and is holding up preparation of the land for the 1949 season.

*Rubber.*—Production on Sanje Estate was hampered by shortage of labour but even so the output amounted to fifty tons compared with forty-five tons in 1947.

## Pests and Diseases

*American Bollworm (Heliothis armigera).*—Losses from this pest, though by no means negligible, were lower than usual.

*Field Mice.*—Sporadic outbreaks were reported from various parts of the Province but did not reach epidemic proportions. Stocks of barium carbonate, which were exhausted during last year's outbreak were replenished and remain in readiness for any future epidemic.

*Brown Streak of Cassava.*—Variety trials were continued at Morogoro Farm and three varieties received from Amani, remained free from infection, namely :—

| *Variety* | *Origin* |
|---|---|
| Ankrah | Gold Coast |
| Aipin Valenca | Belgian Congo |
| 4026/20 | Amani |

The widespread incidence of *Brown streak* in the heavy soils on the plains of Morogoro, Kilosa, Ulanga and Rufiji Districts is a major obstacle in establishing adequate reserves of cassava. On light sandy soils and at altitudes above 2,000 feet cassava apparently remains free from *Brown streak* and is a staple crop. The reduced yield and bitter taste caused by this disease deter Africans from attempting to grow it at lower altitudes and on heavier soils.

*Coconut Beetle (Oryctes monoceros).*—In Bagamoyo and Uzaramo Districts a vigorous campaign for the control of this pest was successfully undertaken under the ægis of officers specially detailed for this work. In the words of the Agricultural Assistant, Bagamoyo :—

> "The launching of the coconut sanitation campaign in the early part of the year met with good results and, in some of the suburban and more distant parts of Bagamoyo, the cemetery-like landscape has been eliminated.

On the European-owned estate alone nearly 3,000 dead and diseased palms have been felled and buried. Work of a similar nature has been undertaken in the vicinity of Dar es Salaam".

Although good progress has been made in the destruction of bush and dead palms a great deal remains to be done.

*Palm Weevil.*—Specimens of a weevil closely resembling *Rhina amplicollis* were found in coconut pantations in Mafia island. Pending the collection of further specimens for identification purposes, it is not possible to state the identity of this pest which appears to be a more serious menace than the Coconut beetle (*Oryctes monoceros*). The weevil appears to favour oviposition in the trunks of palms which have been charred or scorched by bush fires. Small holes about one-eighth of an inch in diameter at a height of three feet from the ground indicate that oviposition has occurred. If there is a heavy infestation of larvæ within the trunk of the palm, a steady "bubbling" noise can be heard from a distance of a few feet. The larvæ tunnel through the trunk ultimately killing the palm, if the infestation is sufficiently severe. Pupation appears to take place close to the surface of the trunk at about the same height as oviposition. The adults emerge leaving a hole approximately five-sixteenths of an inch in diameter and, where a large number of adults have emerged, the typical appearance is as if a charge of large shot had been discharged at the trunk of the palm.

*Vermin.*—With the assistance of three resident European planters a very successful poisoning campaign was undertaken against the ever increasing hordes of pigs on Mafia Island. Over 1,200 pigs were killed. In Bagamoyo and Uzaramo District 564 pigs and 703 baboons were poisoned by trained agricultural instructors. In Kilosa District many hundreds of baboons were poisoned by Africans working under the direction of the Crop Supervisor. Game Scouts continued to afford valuable protection to crops by the destruction of elephant, buffalo and hippopotamus. The Senior Agricultural Assistant, Kilosa, reports that owing to their assistance damage to crops was negligible.

## Soil Conservation

The Agricultural Officer, Morogoro, undertook a series of transect surveys of typical areas in the Uluguru Mountains and prepared a preliminary report on the problem of soil erosion in the Ulugurus. A detailed survey of a small area on the Northern slopes of the Uluguru mountains was undertaken by the Assistant Conservator of Forests, Morogoro. It will not be possible to implement their findings and recommendations until additional trained staff is available.

In the mountain areas of Morogoro and Kilosa Districts prohibition of grass fires was effectively maintained. As a result of this policy, which was started in 1943, there has been a noticeable development of bush regeneration in parts of the Uluguru mountains.

## African Census

Throughout the Province the Agricultural Instructors were enrolled as enumerators for the African population census. Normal field work was dislocated just at the commencement of the marketing season. Fortunately a population census is not an annual event.

## Protection of Stored Grain

Last year a simple grain inspection and protection service was inaugurated at Morogoro, Kilosa and Kimamba, where deliveries from district markets were stored by the Produce Control. All grains had to be dry and free from dirt and pests and diseases. After inspection and acceptance all bags were dusted on both sides with approximately 1½ oz. of "Kensil G" containing ·5 per cent "Gammexane". This method gives a reasonable degree of protection against weevil infestation provided the bags are stored in a closed godown so as to obtain the maximum fumigant effect from the "Gammexane". The protection thus afforded is surprisingly effective but in open sided godowns it is not as effective as one would wish.

As a result of representations made by the authorities in London, permission was obtained to treat the grain by an admixture of 8 oz. of diatomite containing ·025 per cent Gammexane per 100 kilos of grain. Preliminary trials had shown that provided the dust was evenly distributed throughout the grain in the bag "Gammexane" of this strength afforded a very effective protection against infestation by grain weevils (*Calandra Oryzæ*). It is important that all the individual grains should be coated with the insecticidal dust, as weevil infestation can occur if the admixture is patchy. It had been suggested that the meal made from grain treated in this manner would be unpalatable. Palatability tests using meal milled from unwinnowed maize, which had been protected with "Gammexane", proved such fears to be groundless. There was no unpleasant taint and those Africans who undertook the palatability tests agreed that maize so protected is very much sweeter than the normal meal made from commercial maize which is frequently weevily, bitter tasting and causes diarrhœa. The object for the 1948 season was to evolve a method of effectively treating grain brought into district markets and the following technique was found to be simple, effective and cheap.

*The method of application.*—The dust is applied by means of a cylindrical tin cannister measuring 12½ inches in length by 2¾ inches in diameter, which holds 8 oz. of "Kensil G". It is provided with a hinged lid, which is perforated with twenty-four holes each approximately three thirty-seconds of an inch in diameter. Sellers, after selling their maize, leave the buying booth and go to the bagging shed where they empty their basket loads slowly into a gunny bag held in readiness by two Africans. At the same time a third African holds the tin upside down at an angle of 45° and taps the bottom with his hand—the speed at which he taps varying with the rate at which the seller is pouring the grain from his basket into bag. The operator with the tin soon learns to adjust his speed of tapping so that one container suffices for one bag. The important point is that he must direct the dust into the column of grain falling from the basket, whilst a fourth African assists sellers in pouring heavy loads of grain slowly into the bags. Each bagging and dusting team thus consists of four men and the rate of dusting and bagging per team is 18-20 bags per hour.

It is usually necessary to have two or three bagging teams at work and one or two agricultural instructors on the spot to control the stream of sellers as they come from buying booth and to keep the teams supplied with re-filled containers and empty bags. The simplest method of re-filling the containers is by keeping the "Gammexane" dust in an open basket into which the empty containers can be plunged. It is essential that each team is kept supplied with refills for sellers are apt to continue pouring their maize into the bag

whether or not dust is being applied. After sewing, the bags are marked with the sign to show that the contents have been dusted and to indicate the market at which the dusting was done. Thus all the markets in one area may be marked with an X and one or more dots, thus—

| | | |
|---|---|---|
| Mkuyuni | = | X |
| Matombo | = | X· |
| Mvuha | = | X· |
| Duthumi | = | ·X· |
| Dakawa | = | ·X· |

In another area the identity mark might be N with a similar series of dots. Ordinary liquid stencil ink is used for the marks and is best applied with a half inch paint brush.

Samples drawn from bags of maize, which were protected in the manner described above, show no signs of weevil attack after three months in storage. Where dusting has been carried out carelessly weevil attack does develop to some extent. It is certain, however, that, where clean dry maize is properly treated in this manner, 8 oz. of ·025 per cent "Gammexane" affords complete protection from grain weevils for as long as one would normally wish to store the grain. Experimental lots of maize treated in this manner are still free from weevils after two years storage in a godown at Morogoro.

A further point is that the continued use of this system, combined with the initial disinfestation of the godowns, results in the godowns remaining free from weevils; so that consignments of untreated grain tend to remain in good condition for a longer period than usual. The cost is approximately fifteen cents per bag worked out as follows :—

| | | |
|---|---|---|
| Cost of 8 oz. "Kensil G" ·025 | =11 | cents per bag |
| Labour, 4 men at Sh. 1/- per day | = 4 | ,, ,, ,, |
| Total | =15 | ,, ,, ,, |

The tonnage of grain protected this season was approximately 2,000 tons. It is contended that only by some such means as this will it be possible to prevent stored grain from deteriorating during prolonged storage, particularly in regions of high temperature and humidity, in the absence of adequate storage facilities and grain driers. The technique described above is simple and cheap and can supplement the storage and drying facilities which are to be provided.

## Conclusion

I wish to take this opportunity of thanking all those officers of Provincial Administration and the technical services who have assisted the Department so readily at all times. In particular, I would like to thank the District Commissioners at Mahenge and Utete for their able and unfailing help in the absence of an Agricultural Assistant at district headquarters.

Reviewing the general trend of agriculture in the Province during the past five years one must admit that in many cases production figures in 1948 were not as high as had been anticipated; but there are definite signs of a quickening tempo throughout the Province. Tractor ploughing for Africans in the Rufiji, increased vegetable supplies from Morogoro, the export of hundreds of tons of maize from famine-prone areas in Bagamoyo, steadily expanding production

in the sleeping sickness settlements of Ulanga, the Kilangali and other irrigation schemes in Kilosa, a welcome improvement in the condition of hundreds of coconut plantations in Uzaramo and Bagamoyo, extensive vermin destruction in Mafia and other districts, the greatly increased demand for cotton seed in Ulanga, and the very real effort which the sisal industry is making to produce its own food requirements, all serve to engender the conviction that there will be a marked increase in production throughout the Eastern Province in the very near future. It is therefore a matter of great urgency that the existing roads should be improved to enable them to carry a steadily expanding output of native produce from outlying parts of the Province.

A. H. Savile,
*Provincial Agricultural Officer,*
*Eastern Province*

## SUMMARY OF AGRICULTURAL PRODUCE SOLD DURING 1948

*(in metric tons)*

| Produce | Price per ton to producer | Ulanga | Kilosa | Morogoro | Bagamoyo | Kisarawe | Rufiji | Mafia | 1948 | Approximate value to producers | 1947 | 1946 | 1945 | 1944 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Food Crops* | £ | | | | | | | | | £ | £ | £ | £ | £ |
| Beans, mixed ... | 10 | – | 322 | 39 | – | – | – | – | 361 | 3,580 | 341 | 101 | 265 | 900 |
| Cashewnuts ... | 18 | – | – | – | – | 264 | – | 397 | 661 | 11,960 | 348 | 218 | 347 | 463 |
| Cassava ... ... | 5 | – | 30 | 182 | – | – | 70 | – | 282 | 1,185 | 470 | 155 | 1,386 | 259 |
| Cowpea ... ... | 12 | 11 | – | 55 | 3 | 42 | 45 | – | 156 | 1,872 | 298 | 80 | 81 | 224 |
| Green Gram ... | 18 | 1 | – | 2 | – | 61 | 6 | – | 70 | 1,260 | 120 | 16 | 69 | 7 |
| Jaggery ... ... | 13 | 70 | 1,200 | 200 | – | – | – | – | 1,470 | 19,110 | 250 | 1,160 | 730 | 463 |
| Maize ... ... | 7 | 118 | 1,773 | 1,494 | 713 | 726 | 23 | – | 4,847 | 34,139 | 5,747 | 1,920 | 4,369 | 8,767 |
| | 10 | – | 3,400 | 1,104 | – | – | – | – | 4,504 | 45,040 | 6,600 | | | |
| Onions ... ... | 25 | – | 54 | 65 | – | – | – | – | 119 | 2,775 | 89 | 153 | 168 | 129 |
| Potatoes ... ... | 25 | – | 15 | 68 | – | – | – | – | 83 | 1,825 | 82 | 220 | 17 | 55 |
| Pigeon Pea... ... | 18 | 6 | – | 44 | 28 | 80 | 42 | – | 200 | 2,814 | 1,925 | 22 | 114 | 155 |
| Paddy ... ... | 9 | 1,665 | 7 | 3 | 49 | 221 | 325 | – | 2,270 | 19,566 | 6,030 | 427 | 780 | 6,894 |
| Hand-hulled rice ... | 15 | 30 | 77 | 100 | 2 | 74 | 3 | – | 286 | 4,215 | 414 | 123 | 178 | 890 |
| Salt ... ... | 5 | – | – | – | 1,963 | – | 16 | 10 | 1,989 | 9,865 | 4,829 | 2,682 | 1,626 | 2,944 |
| Sorghum ... ... | 7 | – | 140 | 654 | 11 | 194 | 88 | – | 1,087 | 7,665 | 1,333 | 103 | 512 | 2,725 |
| Tacca starch ... | 17 | – | – | – | – | 82 | 4 | – | 86 | 1,394 | 121 | 3 | 153 | 134 |
| Vegetables ... | 20 | – | 200 | 640 | – | – | – | – | 840 | 16,800 | 708 | 773 | 724 | 665 |
| Wheat ... ... | 15 | 48 | – | 2 | – | – | – | – | 50 | 750 | – | – | – | – |
| Dried Fish ... ... | 48 | 130 | – | – | – | – | – | 57 | 187 | 8,950 | – | – | – | – |
| Total ... | – | 2,079 | 7,218 | 4,652 | 2,769 | 1,744 | 622 | 464 | 19,538 | 194,781 | 28,008 | 8,139 | 11,607 | 25,801 |
| *Oil Crops* | | | | | | | | | | | | | | |
| Castor seed ... | 20 | – | 831 | 34 | – | – | – | – | 865 | 17,000 | 698 | 342 | 268 | 131 |
| Copra ... ... | 32 | – | – | – | 456 | 1,677 | 889 | 1,819 | 4,841 | 154,912 | 2,139 | 4,637 | 5,448 | 4,663 |
| Sesame ... ... | 18 | 1 | 4 | 15 | 14 | 138 | 180 | 5 | 357 | 6,426 | 201 | 224 | 523 | 606 |
| Sunflower ... ... | 18 | 10 | 80 | 15 | 2 | – | – | – | 107 | 1,926 | – | – | – | – |
| Total ... | – | 11 | 915 | 64 | 472 | 1,815 | 1,069 | 1,824 | 6,170 | 180,264 | 3,038 | 5,203 | 6,239 | 5,400 |

SUMMARY OF AGRICULTURAL PRODUCE SOLD DURING 1948 (*contd*).

(*in metric tons*)

| Produce | Price per ton to producer | Ulanga | Kilosa | Morogoro | Bagamoyo | Kisarawe | Rufiji | Mafia | 1948 | Approximate value to producers | 1947 | 1946 | 1945 | 1944 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Other Crops* | £ | | | | | | | | | £ | £ | £ | £ | £ |
| Beeswax ... ... | 350 | – | 6 | 1 | – | – | – | – | 7 | 2,450 | 6 | 10 | 4 | 10 |
| Gum copal ... | 40 | – | – | – | 2 | 20 | 12 | – | 34 | 1,360 | 59 | 57 | 27 | 65 |
| Kapok ... ... | 125 | – | 50 | 150 | – | – | – | – | 200 | 25,000 | 220 | 220 | 95 | 66 |
| Raffia ... ... | 60 | – | – | – | – | 18 | – | 3 | 21 | 1,260 | 84 | 75 | 67 | 66 |
| Para rubber ... | 95 | 50 | – | – | – | – | – | – | 50 | 4,750 | 46 | – | – | – |
| Sisal ... ... | 80 | – | – | – | – | – | – | – | 36,375 | 2,895,462 | 32,579 | 34,825 | 33,985 | 31,717 |
| Seed cotton ... | 24 | 960 | 739 | 1,047 | 772 | 18 | 119 | – | 3,665 | 89,268 | 3,926 | 3,615 | 3,080 | 4,830 |
| | 55 | – | 450 | 188 | – | – | – | – | 638 | 35,090 | | | | |
| Total ... | – | 1,010 | 1,245 | 1,386 | 774 | 56 | 131 | 3 | 49,990 | 3,054,640 | 36,920 | 38,802 | 37,258 | 36,754 |

EASTERN PROVINCE COTTON STATISTICS, 1948 SEASON

| District | Ginnery | Seed Cotton in Tons | | | | | Cash paid to Native growers | Lint production in 400lb. bales | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Native | | | | | | | | | |
| | | A | C | Planters' Crop | Total | %C | £ | AR | Crop | BR | Total |
| MOROGORO: | Morogoro ... ... ... | 186 | 35 | 124 | 345 | 16 | 5,558 | 309 | 210 | 61 | 580 |
| | Turiani ... ... ... ... | | | | | | | | | | |
| | Duthumi ... ... ... | 391 | 79 | 64 | 534 | 17 | 11,456 | 667 | 108 | 144 | 919 |
| | Mikesse ... ... ... ... | 132 | 38 | – | 170 | 22 | 4,223 | 214 | 36 | 65 | 315 |
| | Ngerengere ... ... ... | 153 | 33 | – | 186 | 18 | 5,123 | 265 | – | 64 | 329 |
| | Total ... | 862 | 185 | 188 | 1,235 | – | 26,360 | 1,455 | 354 | 334 | 2,143 |
| KILOSA: | Rudewa ... ... ... | 133 | 43 | 165 | 341 | 24 | 4,710 | 222 | 281 | 73 | 576 |
| | Kilosa ... ... ... ... | 384 | 84 | 121 | 589 | 18 | 11,474 | 661 | 214 | 151 | 1,026 |
| | Msowero ... ... ... | 74 | 21 | 163 | 258 | 28 | 2,400 | 122 | 269 | 35 | 426 |
| | Total ... | 591 | 148 | 449 | 1,188 | – | 18,584 | 1,005 | 764 | 259 | 2,028 |
| BAGAMOYO: | Mandera ... ... ... | 712 | 60 | – | 772 | 8 | 20,128 | 1,108 | 6 | 105 | 1,219 |
| ULANGA: | Kiberege ... ... ... | 468 | 54 | – | 522 | 10 | 11,990 | 795 | – | 88 | 883 |
| | Malinyi ... ... ... ... | 349 | 88 | – | 437 | 20 | 9,865 | 596 | – | 138 | 734 |
| RUFIJI: | Logeloge ... ... ... | 36 | 14 | – | 50 | 28 | 944 | 58 | – | 24 | 82 |
| | Kilimani ... ... ... | 19 | 8 | – | 27 | 42 | 573 | 31 | 2 | 12 | 45 |
| | Msomeni ... ... ... | 36 | 6 | – | 42 | 14 | 1,000 | 60 | – | 11 | 71 |
| | Total ... | 91 | 28 | – | 119 | – | 2,517 | 149 | 2 | 47 | 198 |
| KISARAWE: | Ngerengere ... ... ... | 14 | 4 | – | 18 | 22 | 438 | included in Morogoro | | | – |
| | GRAND TOTAL ... | 3,087 | 567 | 637 | 4,291 | – | £89,882 | 5,108 | 1,126 | 971 | 7,205 |

# MOROGORO FARM REPORT, 1948

## 1. Introduction

Experimental work on the station was severely limited owing to staff shortages, and preoccupation with District and Production Committee activities. Work was concentrated on the maintenance of varieties (such as cassava, sweet potatoes, maize, sorghum and bananas), the preparation, sale and distribution of planting material and the supply of fresh milk.

## 2. Nurseries

(a) The demand for budded fruit trees and ornamental plants remained very heavy throughout the year. Orders were received from all over the Territory, some of which were reserved for as far ahead as 1950. The rest were supplied to the following extent :—

| | Sold | Issued free | Total |
|---|---|---|---|
| Citrus plants ... ... | 3,516 | 30 | 3,546 |
| Other fruit trees ... | 1,547 | 14 | 1,561 |
| Ornamentals ... ... | 1,503 | 415 | 1,918 |
| | 6,566 | 459 | 7,025 |

| | |
|---|---|
| Canna corms ... ... ... | 7½ bags. |
| Maize seed selected ... ... | 5 bags. |
| Cassava ... ... ... | 112 bundles |
| Lemon grass ... ... ... | 6 bundles |
| Sorghum ... ... ... | 7½ bags |
| Cowpea ... ... ... | 100 kilos |
| Sweet potatoes ... ... | 20 lb. |
| *Fruit.* | |
| Grapefruit ... ... ... | 2,482 |
| Oranges ... ... ... | 425 |
| Lemon and limes ... ... | 50 |
| *Seed.* | |
| Avocado ... ... ... | 200 |
| Cassia nodosa ... ... | 3 lb. |
| Cassia alata ... ... ... | 1 lb. |
| Gassia grandis ... ... | 1 lb. |
| Pawpaw ... ... ... | 2½ lb. |

(b) *The Citrus Orchard:* Young budded trees were attacked by Aphis but no real damage was done as after the first spraying with nicotine sulphate the trees soon recovered. The big old trees in the main orchard showed a yellowing of the leaves, die-back and a form of gummosis. A trench was dug round a few of the trees immediately below the outside of the branches and filled with compost, and although the roots were severely pruned thereby, these trees have now fully recovered and are in a very healthy condition. The rest of the orchard was composted by digging trenches in a square on the outside of the branches and although they recovered more slowly, they are now in as good health as those which were trenched more closely.

(c) *Extension of Citrus Nurseries:* A new area has been opened as the old nursery is badly in need of rest since it has been in use for over ten years. It will be laid down to grass and Kudzu vine.

## 3. Dairy

During the year the total milk production was 3,539 gallons of which 2,557 gallons were distributed as whole milk to customers, the balance being fed to calves. The average yield per cow (computed by dividing the total production for the year by the average number of cows in milk per month or

portion of a month) was 208 gallons as compared with 181 gallons and 182 gallons during 1946-47 respectively.

The health of the herd remained good but was only maintained by routine dipping against East Coast fever and weekly blood slide examinations combined with stibophen injections for the treatment of Trypanosomiasis. In all 147 injections were given during the year. Only one case of abortion occurred which compares favourably with the previous year.

### 4. Cropping

(a) *Silicophosphate Trial, second year.*—This trial is undertaken for the East Africa Fertilizer Team. In the first year the results were not significant, but this year the nitrogen with the addition of potash gave a significant difference as shown in the table below :—

Table I

*Morogoro Silicophosphate Trial, 1948*

Summary in 200 lb. bags shelled maize per acre

| | No P | | | | 2P | | | | 4P | | | | Mean | Sig. Diff. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | O | N | K | NK | O | N | K | NK | O | N | K | NK | | |
| B.P.A | 7·3 | 9·3 | 8·2 | 10·7 | 8·3 | 11·3 | 8·4 | 9·5 | 9·0 | 10·1 | 8·6 | 10·1 | 9·2 | 2·1 |
| | | | | * | | * | | * | | * | | * | | |
| | 78·7 | 101·1 | 89·0 | 115·5 | 89·6 | 122·9 | 90·8 | 102·8 | 97·1 | 109·2 | 93·6 | 109·7 | 100·0 | 22·6 |

*Significantly higher than Control (N by itself just fails to reach significance).

| N. Effect | K. Effect | P. Effect |
|---|---|---|
| N 10·2 bags per acre. | K 9·2 bags per acre. | 4 P 9·4 bags per acre. |
| No N 8·3 bags per acre. | No K 9·2 bags per acre. | 2 P 9·4 bags per acre. |
| Sig. Diff. 0·78 per acre. | Not significant. | No P 8·8 bags per acre. |
| | | Not significant. |

*Cropping.*

(b) *Cassava varieties.*—Fourteen mosaic resistant varieties were planted in a trial, interplanted with a diseased local variety. Table II shows the results after having inspected the trial at approximately three-monthly intervals.

## TABLE II

### CASSAVA: RESISTANCE TO VIRUS DISEASES

| | Variety | Origin | Total No. of Plants | RECORDED ON 24/8/48 | | | RECORDED ON 22/11/48 | | | RECORDED ON 6/1/49 | | | Whether Free from Mosaic | Whether Free from Streak | Whether Free from both Mosaic and Brown Streak |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Mosaic | Brown Streak | Free | Mosaic | Brown Streak | Free | Mosaic | Brown Streak | Free | | | |
| 1 | Ankrah | Gold Coast | 1/03 | 36 | — | 67 | 47 | — | 56 | 47 | — | 56 | — | Yes | — |
| 2 | 4029/10 | Amani | 114 | 5 | 6 | 103 | 7 | 6 | 101 | 7 | 6 | 101 | — | — | — |
| 3 | Binti Minsi | Amani | 112 | — | 16 | 96 | 3 | 16 | 93 | 3 | 16 | 93 | — | — | — |
| 4 | 7244/E | Amani | 114 | 1 | 11 | 102 | 1 | 13 | 100 | 2 | 13 | 99 | — | — | — |
| 5 | 405/1 | Amani | 111 | 5 | 36 | 70 | 6 | 36 | 69 | 7 | 37 | 67 | — | — | — |
| 6 | 4026/20 | Amani | 116 | 4 | — | 112 | 4 | — | 112 | 4 | — | 112 | — | Yes | — |
| 7 | Aipin Valenca | Belgian Congo | 112 | 38 | — | 74 | 39 | — | 73 | 39 | — | 73 | — | Yes | — |
| 8 | Msity | Zanzibar | 114 | 19 | 17 | 78 | 20 | 17 | 77 | 20 | 17 | 77 | — | — | — |
| 9 | 4026/16 | Amani | 102 | — | 83 | 19 | — | 84 | 18 | — | 84 | 18 | Yes | — | — |
| 10 | 4023/3 | Amani | 1/05 | — | 2 | 103 | — | 4 | 101 | — | 4 | 101 | Yes | — | — |
| 11 | KRU | Gold Coast | 11/0 | 113 | 2 | 96 | 13 | 2 | 96 | 13 | 2 | 96 | — | — | — |
| 12 | 4029/11 | Amani | 114 | 1 | 13 | 1/00 | 3 | 13 | 98 | 3 | 15 | 98 | — | — | — |
| 13 | Lide | Bagamoyo | 105 | 19 | 39 | 47 | 56 | 39 | 10 | 56 | 39 | 10 | — | — | — |
| 14 | Dihanga | — | 121 | — | 41 | 80 | 1 | 41 | 79 | 1 | 41 | 79 | — | — | — |

(c) *Alternate Husbandry.*—Blocks Nos. 1, 2, 3, 4, 8 and 9 after having been cropped for three years, have been planted with *Panicum maximum* for three years' rest.

Blocks Nos. 7, 12, 13, 14, 15, were under their first year of cropping, after three years' rest. The maize, sorghum and cowpea yielded as follows :—

| | Kilos per acre |
|---|---|
| *Maize.* | |
| Block 12 Durum ... ... ... ... ... ... ... ... | 385 |
| ,, 14 Katumbili ... ... ... ... ... ... ... | 347 |
| *Sorghum.* | |
| Block 13 Bangala ... ... ... ... ... ... ... | 317 |
| ,, 15 Karachi ... ... ... ... ... ... ... | 245 |
| *Cowpea.* | |
| Block 7 Local Selection ... ... ... ... ... ... | 300 |

(d) *Short term (Uganda) Sorghums.*—These yielded as follows :—

| Block | Variety | Yield 1947 Kilos per acre | Yield 1948 Kilos per acre |
|---|---|---|---|
| 38 ... ... | L.I ... ... | 390 ... ... | 205 |
| | T.15 ... ... | 670 ... ... | 295 |
| 39 ... ... | L.10 ... ... | 492 ... ... | 85 |
| | T.18 ... ... | 556 ... ... | 170 |
| 40 ... ... | K.6 ... ... | 400 ... ... | 175 |
| | K.9 ... ... | 390 ... ... | 130 |

The blocks on which these varieties were planted were under their second year of cropping.

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## CENTRAL PROVINCE ANNUAL REPORT, 1948

### Weather

The 1947-1948 season was a typical Central Province season with erratic, badly-distributed and inadequate rains in many areas, but with some parts sufficiently well favoured to bring through an average grain crop. For the third year in succession the rains broke on the last day of November, and the first week of the season saw useful and unusually gentle rains, so that there was little serious run off in the normally dangerous first few weeks. A protracted dry spell followed lasting nearly three weeks. From Christmas until towards the end of January there were again favourable rains, but after that a serious drought ensued, which in Kondoa lasted for almost the proverbial forty days. Fortunately March was a satisfactory month, and if those rains could have been carried on well into the middle of April the position in some of the less happy areas might have been retrieved. A short table showing the distribution of the rains during the season is given below. The last line giving the rainfall total from Christmas to the end of the season shows the amount of rain a large proportion of crops had to be content with; because a large proportion of the crops had to be replanted from Christmas onwards, and this was all the rain they received. That Kondoa has managed to produce a harvest at all on twelve and a half inches is remarkable.

## Table No. I

*Rainfall Distribution: 1947-48 Season*

| | Year | Dodoma | Kondoa | Mpwapwa | Singida |
|---|---|---|---|---|---|
| November | 1947 | 0·50 | 1·74 | 0·22 | 0·00 |
| December | 1947 | 7·60 | 3·25 | 4·84 | 4·75 |
| January | 1948 | 3·15 | 4·53 | 6·83 | 4·40 |
| February | 1948 | 1·28 | 0·01 | 1·66 | 3·99 |
| March | 1948 | 5·19 | 5·75 | 4·83 | 7·44 |
| April | 1948 | 0·97 | 1·35 | 2·08 | 0·44 |
| May | 1948 | 0·25 | 0·67 | 0·38 | 0·00 |
| June | 1948 | 0·00 | 0·00 | 0·28 | 0·00 |
| | | 18·94 | 17·30 | 21·12 | 21·02 |
| Rainfall for period Xmas 1947 to end of rains | | 14·37 | 12·50 | 16·97 | 17·26 |

## Food Position

Food supplies within the Province were ample and in places even abundant during the first half of the year. The abundance was in some respects a hindrance because it engendered in too many people an improvident outlook. Preparation of the land and early planting should have been completed before or soon after the rains broke (according to the different tribal customs); but the sense of security given by the overflowing grain bins made an all too prevalent procrastination even easier to adopt. So a large number of people missed the early rains mentioned above, and in Gogoland particularly the major proportion of the crops only started their season after Christmas. This coupled with the general poorness of the rains meant that the 1948 harvest was in a large part of the Province below average, and in some sections virtually a failure. These latter areas included parts of Usandawe and Burungi (Kondoa), Gulwe (Mpwapwa), Msanga-Hombolo (Dodoma) and the inevitable Bahi Depression (both Dodoma and Manyoni section).

Although parts of the Province were suffering food shortages towards the end of the year, the reserves which had been established as part of the grain silo scheme was a reassuring factor and a start was made to draw on these reserves in Sanzawa (Kondoa) (local reserves), and in the Bahi Depression (local reserves imported from Singida silos). The presence of the various openings of work such as tsetse clearings, dam building and the Groundnut Scheme reduced the anxieties attendant on food shortages, because there was thus no excuse for any able bodied person not to work for his food requirements.

The number of silos now in existence total one hundred and forty-three of which thirty-nine were built in 1948. Most of the grain in the silos was 1947 grain, and where the proportion of millet was high the condition of the grain was remarkably good except for the few inches of the surface layers, which of course were heavily infested with grain pests. Other silos had mainly sorghum and in these cases deterioration was more advanced, but still not serious.

In addition to the reserves held in the grain silos, further reserves were built up and held in native-type wicker baskets. The amounts thus held are difficult to estimate, but probably total 1,000 tons.

*Grain Crops.*—The bad distribution of the rains as described in paragraph 2 above and the improvidence of many people who in October and November, 1947, could not look beyond into 1948, resulted in a year of poor harvests except in parts of Singida. Where dry planting was the practice too many people found the rains had already started before they were out in the fields. With a seven-day spell of rain followed by eighteen days of dry weather the difference of only two or three days in the planting date decided the fate of the crop, for only the dry plantings and plantings made in the first day or so of the rainy spell stood any chance of survival. A great deal of replanting had therefore to be undertaken, which meant that a proportion of the grain crop was only four to five weeks old when the serious drought of January-February struck the greater part of the Province. The worst of the drought was in the Kondoa District where no rain fell from 26th January to 3rd March, a total of thirty-seven days. The manner in which the millet and sorghum crops survived this drought was remarkable, and the return of the rains saved the situation and enabled the district, except in two localities, to harvest a crop sufficient with the 1947 reserves to see the people through until the 1949 food supplies become available. In Singida the rainfall distribution during February was much more satisfactory and as a result the grain crops there, though late planted in many cases, were reasonably good and by the end of the harvest serious consideration was being given to changing the grain in the silos. Shortage of gunny bags and shortage of transport, however, made it impossible to dispose of the 1,500 or so tons in the silos to make room for the fresh grain.

The maize crop in all districts except Singida, the Bereko Ridge in Kondoa, and the highlands in South Mpwapwa, was virtually wiped out by the drought But Singida, thanks to the February rains, was able to market more than 1,000 tons of maize.

*Root Crops.*—By the end of February it was evident that the Province was in a dangerous position if the rains in March and April were to fail. A wide-scale sweet potato planting campaign was therefore organized in all districts, and whereas some were disappointing the one in Kondoa and in Singida were particularly successful. The whole aspect of Kondoa changed within the short space of ten to fourteen days, and there was not a cultivator by then who had not ridged a reasonable patch of land. This was the result of very close team work on the part of all departments and the Chiefs, with every officer out in the field working his allocated area into almost one hundred per cent planting of sweet potatoes.

At the end of 1947 a start was made to extend the growing of cassava particularly in those areas such as Manyoni and Dodoma where it had previously proved unpopular. The soils in Dodoma are locally considered to be unsuitable, so it was necessary first to establish the validity of this, and two acres of cassava were planted on typical Gogo soil on the Dodoma Tribal Farm. This cassava struck easily and maintained itself in spite of a most unfavourable season, and by the time the first rains broke had produced at the rate of 4,075 lb. per acre of fresh root (on fourteen inches of rain followed by eight months of dry weather) this yield would indicate that there is no reason why the Gogo should not grow cassava.

In Manyoni, thanks largely to the enthusiasm of the Administrative Officer, the distribution and establishment of the five wagon loads of cassava cuttings imported from the Western Province resulted in almost every village on the scarp edge having a communal cassava plot, which will serve as a nucleus for a wide-scale extension in early 1949. A number of plots were also established in the Bahi Depression, but as feared, the soils in many cases were not suitable, at any rate when taken in conjunction with the poor season that ensued.

### Cash Crops

(a) *Grain.*—As mentioned above the grain harvest except in Singida was mostly below average, in some cases extremely poor. No grain was therefore marketed except maize in Singida. Had gunny bags and transport facilities been available, then it would have been possible also to market at least 1,500 tons of sorghum and millet, the contents of the grain silos, which could then have been replenished with fresh stocks.

(b) *Rice.*—The poor rains and the prolonged intervening dry period did not provide very favourable conditions for the rice grown throughout the Bahi Depression. Surprisingly enough a considerable amount of the crop grown in the deeper bunds survived the dry spell and a fair harvest was obtained. Though only 23 tons found its way on to the produce market there must have been other unrecorded sales. A food count taken in the Manyoni half of the Depression showed at least 150 tons stored in the various houses. In view of the recurrent nature of famines in the Depression the idea of enforcing rice cultivation on non-stock owners was mooted so that these people should have a means of acquiring cash, as the stock owners do, when the purchase of food becomes necessary. To this end a census of all rice growers and their present rice acreage was completed in the Depression. To enforce the cultivation of rice entails making the crop reasonably assured, and rice dams for tiding the young plants over any prolonged dry spells should where possible be provided. Funds were obtained for two such dams, but it was only possible to complete one at Chipamagwe. A comparison of the 1948 and previous rice crops is given below :—

*Rice—Production in Tons*

| Year | Dodoma | Singida | Kondoa | Central Province |
|---|---|---|---|---|
| 1940 | 337 | 7 | 2 | 346 |
| 1941 | 198 | 9 | 3 | 210 |
| 1942 | 496 | 12 | 23 | 531 |
| 1943 | 9 | 9 | — | 18 |
| 1944 | 140 | 1 | — | 141 |
| 1945 | 27 | 2 | — | 29 |
| 1946 | ½ | — | — | ½ |
| 1947 | 69 | — | — | 69 |
| 1948 | 24 | — | — | 24 |

(c) *Groundnuts.*—1948 was again a poor groundnut year, with only 994 tons marketed, the third lowest crop in the past eight years. Singida should have produced, on the acreage planted and on the general growth of the healthy plantings, at least 1,500 to 2,000 tons. Unfortunately an unidentified "wilt" appeared in a large part of the groundnut crop, and this very seriously reduced the yields for the season. The other main area producing groundnuts is Mpwapwa, and the crop there has declined mainly because of the more profitable and more easy culture of castor seed, which crop has been steadily

increasing during the past few years. A comparison of district and provincial production is set out herewith :—

*Groundnuts—Production in Tons*

| Year | Dodoma | Singida | Kondoa | Central Province |
|---|---|---|---|---|
| 1940 | 1,185 | 927 | 152 | 2,264 |
| 1941 | 785 | 1,200 | 118 | 2,103 |
| 1942 | 1,360 | 1,966 | 185 | 3,511 |
| 1943 | 48 | 821 | 2 | 871 |
| 1944 | 887 | 256 | 18 | 1,161 |
| 1945 | 905 | 353 | 2 | 1,260 |
| 1946 | 614 | 107 | — | 721 |
| 1947 | 443 | 1,214 | 20 | 1,677 |
| 1948 | 161 | 833 | — | 994 |

(d) *Onions.*—The 1948 crop was smaller (at 296 tons) than the 1947 record crop of 415 tons. Singida is the principal producer, and was responsible for 278 tons of the above total. High prices prevailed in May, ranging up to ninety cents to one shilling per kilogram, stimulated by a strong demand in Nairobi. The supply of seed imported from India is never enough to meet local requirements and the possibilities of founding a local onion seed industry had previously been tried out in Mbulu. Owing to onion thrips the attempts there were abandoned, and alternative localities chosen. Singida was considered and a small trial plot of onions for seed was established near Msingi in the Duruma valley. A report on this is given under the Seed Farms Section.

*Onions—Production in Tons*

| Year | Dodoma | Singida | Kondoa | Central Province |
|---|---|---|---|---|
| 1945 | ? | 99 | ? | 256 |
| 1946 | ? | 122 | ? | 174 |
| 1947 | ? | 342 | 34 | 415 |
| 1948 | 12·7 | 278 | 6 | 296 |

(e) *Potatoes.*—Only a small output of potatoes is produced in the Province, ranging from 40 to 60 tons. This season the crop has been smaller than usual with only 20 tons marketed.

(f) *Castor Seed.*—With further increases in the price of castor seed in 1947 and the fact that the culture of this crop is easy and suited to the Mpwapwa district, the production in 1948 was again considerably increased. The crop for the past year totalled 473 tons, which exceeded by 167 tons the previous year's record crop. Kondoa and Singida districts have also been showing interest, and the production there is steadily rising. Comparative outputs for the past few years were as follows :—

*Castor Seed—Production in Tons*

| Year | Dodoma | Singida | Kondoa | Central Province |
|---|---|---|---|---|
| 1945 | ? | ? | ? | 160 |
| 1946 | ? | ? | 15 | 94 |
| 1947 | ? | ? | 39 | 306 |
| 1948 | 397 | 7·6 | 68 | 473 |

(g) *Gum.*—For the second year in succession there has been a marked fall off in the collection of gum. Last year the reduction could partly be accounted for by the bumper harvests making it unnecessary for all but the so-called professional gum collectors to go out and supplement their cash

earnings. This year, with poor rains, there should have again been an increase in the gum marketed. This was not so and can only be ascribed to the plague quarantine restrictions in the Sekenke-Shelui areas, whence comes a large proportion of the Province's gum. As shown below the total of 76 tons is the lowest for the past nine years.

*Gum—Production in Tons*

| Year | Dodoma | Singida | Kondoa | Central Province |
|---|---|---|---|---|
| 1940 | 35 | 165 | — | 200 |
| 1941 | 34 | 152 | — | 186 |
| 1942 | 36 | 218 | — | 274 |
| 1943 | 27 | 138 | — | 165 |
| 1944 | 80 | 281 | — | 361 |
| 1945 | 20 | 150 | 1 | 171 |
| 1946 | 43 | 139 | 1 | 182 |
| 1947 | 48 | 58 | — | 106 |
| 1948 | 21 | 55 | — | 76 |

(h) *Beeswax and Honey.*—There was a satisfactory increase in the collection of beeswax, which at 92 tons was more than double the best output over the past five years. Honey collection also was well maintained at 72 tons.

*Beeswax and Honey—Production in Tons*

| Year | Dodoma | | Singida | | Kondoa | | Central Province | |
|---|---|---|---|---|---|---|---|---|
| | Wax | Honey | Wax | Honey | Wax | Honey | Wax | Honey |
| 1940 | 16 | — | 8 | — | 14 | — | 38 | — |
| 1941 | 31 | — | 7 | — | 19 | — | 59 | — |
| 1942 | 21 | — | 9 | — | 18 | — | 48 | — |
| 1943 | 88 | — | 36 | — | 26 | — | 150 | — |
| 1944 | 15 | — | 8 | — | 8 | — | 31 | — |
| 1945 | 15 | 28 | 5 | — | 14 | 63 | 34 | 91 |
| 1946 | 18 | 17 | 3 | — | 9 | 40 | 30 | 57 |
| 1947 | 17 | 89 | 9 | — | 14 | 96 | 40 | 185 |
| 1948 | 54·3 | 148 | 25 | 6¼ | 13 | 51 | 92 | 175 |

(i) *Sunflower.*—Twenty-five tons of sunflower seed were distributed free in this first year of stimulating the production of sunflowers. The bulk of seed went to Singida (15 tons) and to Mpwapwa (5 tons). A number of setbacks, including the depredations by field mice, the poor season and the lack of knowledge as to how the crop should be planted did not promise to give a very good return. Yet in spite of there being little evidence of sunflower plantings, the final output for the Province totalled 182 tons. The people who have grown it are satisfied with the value of a sunflower crop, and there is an indication that there will be a great deal more planted in 1949.

## Pests and Diseases

(a) *Locusts.*—No locusts were reported during 1948.

(b) *Army Worm.*—This pest was reported from all districts and caused a considerable amount of damage in various localized areas necessitating in some cases replanting of the grain crops.

(c) *Stalk Borer* was prevalent in all districts, and particularly serious on some of the early planted maize in Singida.

(d) *Elegant Grasshopper* were reported as causing damage particularly on sunflower plantings.

(e) *Hilda*.—In Singida a wilt disease of groundnuts made its appearance in March and swept through the district, causing heavy damage to what promised to be a very good groundnut crop. At first the insect pest *Hilda Patruellis* was suspected of being the cause of the "wilt", and plenty of *Hilda* was in fact found on groundnut plants near Singida. A more extensive survey showed, however, that in many parts of the district the same "wilt" was taking toll of the groundnuts without there being any sign of *Hilda*. Affected plants were rushed to the Plant Pathologist at Lyamungu but no fungi or bacteria were found. Unfortunately prior commitments and difficulties of transport prevented both the Entomologist and the Plant Pathologist from visiting the district at the time when the "wilt" was at its height.

(f) *Striga*.—*Striga asiatica* was found in many areas principally in the Bahi Depression, but nowhere on any serious scale as yet. A start was made this season to inculcate a *Striga* consciousness, and the pulling of this parasite was enforced in the affected areas.

(g) *Birds*.—Every year birds cause a great deal of damage to the standing grain crops and as 1947 had seen such a favourable season, the bird population had largely increased, thus adding to the worries of a below-average crop resulting from the poor 1948 rains.

(h) *Vermin*.—Baboon and pig took their usual toll of the crops, but it is hoped that, with the arrival of fresh stocks of arsenious oxide, organized campaigns in 1949 will help to reduce the losses incurred through these animals. Buck and elephant also caused damage in many areas, and the mere presence of lion in some parts, and of rhinoceros in others, interfered with the agriculture of those localities by keeping the cultivator from his fields. In most cases satisfactory action was taken.

(i) *Grain Diseases*.—The various grain smuts were present; and *Sphacelia* appeared to be more widespread than usual on Pennisetum Millet.

## Soil Conservation

The problems of soil conservation continue to occupy a considerable proportion of the time of the Departmental Staff with the major emphasis as yet on the extension of contour banking. This admittedly does not attack the root cause of our accelerated soil erosion, which fundamentally is due to incorrect land usage, including principally overstocking as well as primitive and incorrect methods of agriculture. During the past year we have had the benefit of advice from the Senior Agricultural Officer (Soil Conservation), and a small start was made in implementing the very much more complicated and difficult conservation practices of proper land usage. A Pilot Scheme in the Kondoa district was selected and subjected to the necessary preliminary investigations as described below. Besides land usage methods and contour banking further attempts were made to extend the practice of tie-ridging, which practice has to contend with various difficulties such as the system of dry planting amongst the Wagogo and the Wanyaturu, the short-handled hoe of the Warangi, and the general reluctance of all tribes to accept an innovation entailing so much extra labour. The cultivation within or on the edges of gulleys and depressions was discouraged as much as possible, as was the practice of digging a furrow up and down a hill to demarcate any two individual plots. Manuring must always form part of any soil conservation programme because of its improving effects on the absorptive capacity of the soil. To this end, as well as to raise the fertility of the soil, the manuring campaign was

conducted with extra vigour this year, and a most noticeable improvement was obtained in the amount of manure spread.

Further details on soil conservation in respect of the various districts are given below :—

*Dodoma.*—The following areas had not previously been served by the striding level teams of Instructors. Contour banking was enforced on almost all the cultivators within these areas, though the late start caused by August being devoted to census duties prevented the completion of the programme :— Bahi, Makutupora, Zanka, Luatu, Makang'wa, Kinyambwa and Msanga.

Areas where contour banking had been carried out in 1947 and 1948 were given special attention after 15th November to enforce repair and in many cases the rebuilding of the old banks.

*Singida.*—Individual contour banking was pressed within the following chiefdoms : Wilwana, Ukibu, Singida Ikungi and Ihanja. Work progressed satisfactorily at first but tailed off towards the end of the season when some early showers made the cultivators turn to clearing and manuring their land. Repairs to old banks in other chiefdoms were also pressed.

In addition to individual contour banking tribal turnouts were obtained for the construction of contour banks at Mtinko, Kititimo and in the Msughaa clearings.

*Kondoa.*—The effects of soil erosion in the Kondoa district, particularly in the Irangi highlands are at their most advanced stage, and while contour banking must help, the obvious measure to arrest the further ruination of what little land remains is the adoption of rational usage of that land. A meeting of the Provincial and District Staff of the various departments concerned was held in May, and had the benefit of the presence of the Senior Agricultural Officer, Soil Conservation. Five days of touring and discussion resulted in a plan for the rehabilitation of Irangi, carrying several steps forward the original Integrated Plan of 1945. In its original draft the plan envisaged not only the study of and a concentrated drive to reduce the human and stock population in some selected Pilot Area, but also considered parallel movements of population and stock from areas outside the Pilot one, if only to keep pace with the natural increase of the Wairangi. Unfortunately the Irangi Rehabilitation or Development Plan came rather late in the applications for Colonial Development Funds, and had to be considerably modified and changed to an investigation into the proper methods of land usage under conditions such as prevail in the Irangi country. While awaiting the approval for this modified scheme, preliminary work was started with existing facilities and staff. A pilot area was selected embracing the watershed around Kolo, and village surveys of all the arable land, stock numbers, soil types, and vital statistics of the people concerned was conducted by the Kondoa Instructors. The Government Anson photographed the whole area, unfortunately without any success owing to a faulty shutter. The Geological Department kindly loaned a Geologist and a range finder to determine the acreage of the area. And various sociological enquiries and preliminary propaganda were carried out by the District Commissioner.

While a start was being made in adopting the land usage method of approach, the routine extension of contour banking to all arable land was continued.

An attempt to obtain the adoption of trash mulching within the area of a whole village met with almost complete failure, and it was only possible to persuade two of the many cultivators to try this measure in a corner of their fields.

*Manyoni.*—Routine contour banking was pressed and in the area of Makwesi, which is occupied by a fair number of ridge cultivating Wanyamwezi, tie-ridging was extended.

*Mpwapwa.*—The southern end of the district received the attention of the contour banking teams, and the work proceeded satisfactorily. In the northern half of the district a very good response to the repair and rebuilding of the previous year's contour banks was obtained.

### Water Supplies

*Singida.*—A new dam was built at Damaida by the Native Authority. And at Mtinko the local chief turned out all his people to surround an existing spring with a dam wall.

*Dodoma.*—Another enterprising chief was the Wakili of Kikombo who turned out men, women and children to dig a large dam at Mkoa. Unfortunately in the enthusiasm to go as deep as possible, the impervious layer was penetrated and the dam bottom lowered to pervious soil.

*Mpwapwa.*—A number of boreholes and wells were sunk in this district to help existing settlements and resettlement. At Sejere for instance the Overseas Food Corporation put down a borehole and equipped it with a diesel engine and pump, as their contribution to the resettlement of the Hogoro people. Piped supplies have also been installed where needed.

*Kondoa.*—After more than two years of waiting the Kandaga three-inch pipe line which was planned to carry water from the base of the Irangi highland to a point five miles out in the plains, began to move out to its destination. It was laid in two stages. One stage was laid early in the year and the second was completed late in the season and early new year.

The Water Development Department sent a representative to survey and measure other streams and springs rising in the highlands with the object of assessing their potentialities for piping into the plains.

*Manyoni.*—In the Makasuku area a large dam was completed and this rapidly filled with the first storm of the season. A rice dam at Chipamagwe was also completed.

### Rehabilitation and Reclamation

*Kondoa.*—Further extensive anti-tsetse clearing work was carried out both by the Tsetse Clearing Organization and by the tribal turnout. The main clearings were those extending and completing the corridor up and down the Bubu river, thus forming a barrier behind which were withdrawn the population living to the west where recently they had been seriously threatened with sleeping sickness. In Usandawe the clearings were extended, and in the Chungai area the uncleared triangle known as the Itororo Triangle was dealt with. A section of the bush known as Block B was cleared along its western fringe in order to widen the clearing between this bush and the Chungai-Kandaga road.

Whereas the above clearings were all originally established as a defence against tsetse fly, they also serve, if and when water is supplied, as the resettlement areas for those people and their stock who must very soon be moved out of the Irangi highlands, which settlement in its turn ensures the virtual suppression of bush regeneration.

*Singida.*—An advance of fly beyond the original perimeter line at Ussure made it necessary to withdraw to a new line, and a new belt was cleared at Ndago. Other clearings included one at Iambi, and the extension of the Kidaru, Sipuka and Msughaa clearings.

*Manyoni.*—The threat of fly spilling over the scarp from Kilimatinde southward and endangering the whole of the Wagogo cattle lands from the Bahi Depression eastwards made it imperative to clear a barrier measuring sixteen miles by two miles along the base of the scarp from Makasuko to Msakile. Work on this progressed steadily, and by the end of the year some miles of the barrier had been cleared.

### Resettlement

*Kondoa.*—The 1945 Integrated Plan for the Rehabilitation of Irangi envisaged the moving and resettling of one thousand families from the worst eroded villages in the Irangi highlands. The resettlement area chosen was the plains to the east of these highlands (from Chungai to Kisese) and up to the end of 1947 eight hundred and four families were living along this strip of country on the fanslopes of the Irangi highlands. More families could have been moved, but the delay in establishing the Kandaga pipe line hindered this. In 1948 a further one hundred and fifty-one families were moved into the Chungai area. The presence of a good deal of cultivated land owned by people living in the highlands had made such land unavailable for genuine settlers and as the absentee owned plots were scattered at random, they interfered with the orderly settlement of this area (aiming at sixty-four families per square mile). These scattered plots were withdrawn from the absentee owners, and blocks of suitable land were marked within which any person not residing in the Chungai area could cultivate a proportion of his annual crops.

In addition to the Chungai resettlement area, there is similar suitable fanslope land southwards from Chungai to Pahi and Busi which is already being taken up by volunteer settlers, and the possibilities were investigated of bringing all this country within an orderly settlement scheme. This involved some preliminary investigations into water supplies and grazing lands, demarcating absentee cultivator blocks, and recording the number of new settlers, of whom there were one hundred and ninety-one during the past year.

The Bubu river clearings made available another strip of land of which a fair proportion is suitable for settlement, and in fact requires settling in order to control regeneration. The reconnaissance of the Bubu clearings for resettlement purposes was another activity carried out by the various interested departments.

*Mpwapwa.*—The Overseas Food Corporation Groundnut Area in the Kongwa district contained an enclave of about one thousand Wagogo living around the hills of Hogoro. For many reasons, these Hogoro people had to be moved. As no suitable cleared land could be found within the Kongwa chiefdom, the Overseas Food Corporation very generously handed over a portion

of the south-western corner of the Groundnut Area which had been cleared in 1947. This resettlement area, approximately fourteen square miles in extent, included two thousand acres of cleared and windrowed land, suitable for the settlers' first year arable requirements; and a further two thousand acres of flattened bush which after burning would be set aside as grazing land. The Overseas Food Corporation also provided a borehole with a diesel-powered pump and shared in the construction of a ten thousand-gallon reserve tank. The movement from Hogoro was conducted by Overseas Food Corporation transport, and the resettlement area is being treated as a pilot scheme for resettlement, with plans and rules drawn up to cover the proper use of the grazing and the arable land.

### Native Authority Seed Farms

*Dodoma.*—The Tribal Seed Farm carried 11·6 acres of various grain crops for seed multiplication, 5·4 acres of sunflower also for multiplication following selection in the field, four acres of cassava and four acres of sweet potatoes to maintain a reserve of planting material.

The season in Dodoma was particularly unfavourable, precipitation being very irregular. There was the usual drought in January and February. The effects of this rainfall distribution on the grain crops on the farm was not serious, thanks to the manuring (at the light rate of about three tons to the acre) and particularly to the tie-ridging. Yields averaged over 1,000 lb. per acre for the Dobbs sorghum (in spite of fairly heavy stalk borer infestation); 735 lb. per acre for the Awned Bulrush Millet; 799 lb. per acre for the black seeded Sunflower, and 789 lb. per acre for the white seeded Sunflower (in both cases the weights are for winnowed seed).

Small trial plots of Kobe and Korean Lespedeza and of Pueraria were grown, but did not prove satisfactory. The Lespedeza flowered and seeded, but only produced a very poor cover.

A series of eighteen mosaic resistant cassava selections were received from Morogoro (originally from Amani) and established for observation under local conditions. These all gave very poor yields when uprooted at the end of the year.

*Singida.*—The Tribal Farm at Iguguno carried 10·8 acres of maize and sorghum, 9·4 acres of sunflowers, and 7·7 acres of pulses, all for seed multiplication. In addition 8·5 acres of the land was again under grass as part of a demonstration of a system of alternate husbandry.

The Katumbili maize yielded well, and, in spite of damage from monkeys, gave an average of 1,751 lb. per acre. The Swaziland sorghums on the other hand only yielded at the rate of 240 lb. per acre.

Sunflowers yielded at the rate of 576 lb. an acre, which, considering the better soil and rainfall conditions as compared with Dodoma, is poor.

Of the pulses green gram gave the best yields, with an average of 744 lb. an acre, kidney beans a yield of 244 lb. an acre, and cowpeas a very poor yield of 110 lb. per acre.

In addition to the Iguguno Tribal Farm a small onion seed trial block was opened up near Msingi in the Duruma Valley. Only one acre was planted and owing to the late start made some of the plantings did not go in until July. The result of this trial showed that in the first half of June yields of

up to 400 lb. an acre of seed could be obtained, but that yields declined rapidly when planting was later. Thrips unfortunately made its appearance, but only late in the season.

*Kondoa.*—The Native Authority Seed Farm in Kondoa village had never proved very satisfactory; and in view of the importance the plains below the Irangi highlands has assumed as resettlement country, it was decided to transfer the seed farm to some suitable site in the Chungai area. Masange was selected because of its central location and because of the presence of water.

A block of land three hundred acres in extent was demarcated, and sixty acres were stumped and ploughed. This was then put under contour banks, and a large storm drain dug on the top side of the farm. The work on the farm was most ably supervised by a European farm manager, provided by the Native Authority who also contributed the house which was constructed for his use. The Water Development Department assisted by contributing a 2,750-foot pipe line, installed in time to start a tobacco nursery.

The object of the farm was to provide partly a seed farm, partly a demonstration centre, and also a centre where the possibilities of tobacco as a cash crop could be tried out. At present the cultivator in Kondoa has had no suitable cash crop, and it was considered that any resettlement scheme would fail in its primary objectives if some cash crop could not be provided. Three Instructors were therefore sent to Songea to learn the growing and processing of tobacco, and a tobacco nursery sufficient to plant up about thirty acres was started at Masange in mid-September. The seedlings will not only be planted on the Native Authority Farm, but a few selected cultivators in the area are being encouraged to plant up a half acre each.

*Manyoni.*—A small demonstration centre was started at Msakili (near Kilimatinde), which is situated at the base of the Rift Wall under Bahi Depression conditions. The object of the demonstration was mainly to show the value of stirring the soil, the use of tie-ridging and the use of manure in an area where crop failures are more frequent than elsewhere.

### Agricultural Improvement

The agricultural practices of the various tribes in the Province differ in many respects, but they can all benefit by the adoption of fairly simple improvements, among which may be mentioned the tilling of the soil, manuring, tie-ridging, early weeding, and correct spacing.

*Tillage.*—Trials at Dodoma in 1943—1946 have shown that a turning of the soil before planting whether left flat or drawn up into ridges gives improved yields to grain crops of the order of double that obtained by Wagogo methods; the best yields were for ridge cultivation. The Wagogo and the Wanyaturu do not customarily till their land except for groundnuts and sweet potatoes planted after the onset of the rains. It is most desirable that they should start to do so. The practice of pre-rains dry planting is probably sound. The hardness of the soil, makes it almost impossible to till the land before planting with only the hoe as an implement. Ploughing would be the obvious solution, and to this end a number of ploughs have been introduced over a scattered area including all the five districts, and assistance given in the training of oxen and demonstrations. In Singida, at Ikungi, a small co-operative venture

in the training of plough oxen was started, and these oxen were used for providing ploughing facilities at the nominal charge of Shs. 8/- per acre.

While at the present phase of development the change over from hoe to plough should be encouraged gradually through the ox plough stage, the possibilities of mechanized agriculture must also be borne in mind. In the Central Province two Africans have already become very insistent on purchasing tractors, and so as not to hinder any advancement in this direction, every assistance was given these two people, the one Athman Halfani of Bahi being helped to purchase a Fordson and disc plough, the other Leo Matola of Chamkaroma (Mpwapwa) to purchase with the help of Development Fund loan a Trusty tractor. The possibilities of developing some communal ploughing for a whole village are also being considered and advantage was taken of a co-operative gesture by the Overseas Food Corporation to arrange for the ploughing of a block of tribal land near Kongwa. Unfortunately these negotiations only started at the end of the year, too late at that stage to clear any land of stumps.

*Manuring.*—Manuring has been pressed in all the districts except Mpwapwa and very good responses have been obtained. In Mpwapwa a firm conviction exists that manuring is not only of no value, but is definitely harmful. Instructors have laid out small demonstration plots comparing manured with unmanured land as a preliminary step in changing the above attitude.

*Tie-ridging.*—Tie-ridging was pushed mostly in the Singida district, where the introduction of sunflowers as a new crop enabled the department to encourage its culture in village communal blocks on tie-ridges.

ACKNOWLEDGMENTS

Besides the routine work of the department, various new projects and lines of development were started during the year, and without the close and willing co-operation of all members of the Administration, of the Veterinary Department, and of the Water and Tsetse Departments, little progress could have been made. All this asistance has been much appreciated and is gratefully acknowledged.

A. S. STENHOUSE,
*Provincial Agricultural Officer,*
*Central Province*

## General Review of the Year

*Weather.*

| | Season Sept.-May 1947-1948 Inches | Year 1948 Inches | Average for Year Inches |
|---|---|---|---|
| Tabora ... ... ... ... | 30·23 ... | 28·19 ... | 34·92 |
| Tumbi ... ... ... ... | 32·17 ... | 32·22 ... | 35·99 |
| Mwanhala ... ... ... ... | 27·32 ... | 27·41 ... | 31·06 |
| Kahama ... ... ... ... | 44·52 ... | 47·61 ... | 36·86 |
| Kibondo ... ... ... ... | 35·53 ... | 37·10 ... | 45·85 |
| Kasulu ... ... | records incomplete | 46·65 ... | 42·00 |
| Kigoma ... ... ... ... | 28·36 ... | 29·16 ... | 36·14 |
| Sumbawanga (Ufipa) ... ... | 34·99 ... | 26·42 ... | 32·26 |

The rainfall was well below average in most districts but Kahama and Kasulu had satisfactory rains. In Tabora, the rains started late, finished early and there were long dry spells during the wet season. Kigoma had a fairly good season but there were long dry spells in the early part of 1948. Though the rains were light in Nzega, they were well distributed and sufficient for most crops. In Kibondo, the rains were inadequate especially in Kakonko. In Ufipa, the season 1947/48 was satisfactory, but the beginning of the 1948/49 rainy season has been too dry for good planting conditions.

*General Crop Situation.*—Though the 1947/48 season was well below the exceptionally good 1946/47 season, it was by no means a poor one, except for paddy in Unyamwezi. The most outstanding increases over previous years were maize in Mpanda, the palm-kernel trade in Kigoma, and the development of tobacco in Kibondo and sunflower in Unyamwezi, Kigoma and Kasulu.

*Food Supplies.*—Food supplies were satisfactory in all parts of the Province. There were very local food shortages partly due to people concentrating on paid-labour or selling too much of their food. The Province is self-supporting in most produce for fed labour and exported surpluses of cassava, maize, millets, groundnuts, and beans and pulses. The energetic cassava-planting campaigns in Unyamwezi and Kigoma are reaping their reward. Cassava planting is being encouraged in parts of Kibondo where food shortages sometimes occur.

*Agricultural Implements and Tools.*—There is an increasing demand by the Africans of Unyamwezi for ploughs and other implements. As this demand is not met by local traders, the Department and the Administration help by buying tools in bulk, using a Native Authority suspense account, for resale to the cultivators. The following were sold in 1948 :—

| | Ploughs | Barrows | Maize-Mills | Picks | Shovels |
|---|---|---|---|---|---|
| Nzega ... | 38 ... | 6 ... | 4 ... | 5 ... | 5 |
| Tabora ... | 8 ... | — ... | — ... | — ... | — |
| Kahama ... | 10 ... | — ... | — ... | — ... | — |

## District Agricultural Situation

*Tabora.*—The district crops were about average, which is far from high. Only manured land produces crops of any size, and the crops in unmanured land would discourage growers in most other parts of the Territory. The cultivators tend to grow a bigger acreage to counteract reducing yields, and, though they use the manure available, they make little attempt to increase it by crop-residues nor do they retain the fertility of the land by soil-conservation.

The people are accustomed to small yields and resist any efforts to change their methods. They are being encouraged to return to their traditional crops of sorghums, millets and sweet potatoes instead of maize for which the local soils and weather conditions are unsuitable. In some chiefdoms, the opportunities of paid-labour and excessive pombe-drinking are deterrents to crop production.

*Nzega.*—The crops were good in this district despite the small rainfall. The rainfall, however, was insufficient for paddy and a poor crop was harvested. There is a big cattle population and more manure can be used than in other parts of the Province. Nzega is predominently agricultural and pastoral and is not distracted, as Tabora is, by alternative occupations.

*Kahama.*—Fairly good crops were harvested, though not on a level with 1946/47. The Administration is keen to develop the agriculture of the district and it is hoped to make good progress in 1949.

*Kibondo (Buha).*—The tobacco industry in Kibondo is developing in a most promising way now that a permanent Agricultural Assistant is stationed there. Owing to its isolation, this sub-district is hampered by the difficulty of exporting bulky crops and, apart from a good export of beans, has done little more than provide food for its own people. There is a big emigration of labour each year to the sisal estates and other industries.

*Kasulu (Buha).*—A very good crop of beans was harvested. Increased production is not being pressed too hard in this sub-district as the greater part of the cultivation is done on sloping ground, often excessively steep, and increased acreages mean accelerated erosion. In Buha and Kigoma a second or even a third crop is obtained in a year by planting in the damp valley bottoms in the dry season.

*Kigoma.*—This district has been one of the most productive and active in the Province this year. Rehabilitation has begun in the Luiche Delta, a highly productive area largely useless in recent years due to overflooding. The oil-palm industry is taking on a new lease of life and a flourishing new export in palm-kernels has developed. There is a big export of cassava and cassava flour from the district.

*Ufipa.*—Agriculture in this district is being developed, and, as a start, an Agricultural Assistant's house and an Agricultural Development Centre are being built. One of the first essentials is to teach the Wafipa the value of manuring their crops.

*Mpanda.*—Since its creation in 1947, this district has done well agriculturally. It is fortunate in having a local market in the Lead Mines for its agricultural produce.

### Crops in Detail

*Cassava.*—In recent years this crop has developed from a famine reserve and local food crop to one of the main cash crops of the Province. In Kigoma district, the main producing area, 1,674·2 tons were purchased from the growers for Shs. 200,235/-.

*Sweet Potatoes.*—This is a valuable food crop especially in the western parts of the Province and also in parts of Tabora and Nzega where favourable conditions permit survival through the dry season.

*Potatoes.*—3·7 tons of European potatoes were exported from Ufipa this year.

*Sunflower.*—Ten and a half tons of seed were distributed in Unyamwezi, Kigoma and Kasulu. Though a little suspicious at first, the people have taken very favourably to the crop; its high price and the ease with which it is harvested make it popular. It may tend to replace groundnuts to some extent in Unyamwezi, but this tendency is being discouraged, as sunflower should be an addition not a replacement. Unyamwezi was the chief producer, railing 174 tons.

*Sesame.*—Sesame is of little importance and is likely to be almost wholly ousted by sunflower.

*Maize.*—Mpanda district leads the field in maize production, marketing 1,223 tons. Maize suffered in Ufipa from the poor rains. Kigoma marketed 425 tons from a fairly good crop, but the 1,508 ton crop from the Unyamwezi districts is a tribute to the persistence if not to the commonsense of the Wanyamwezi, who continue to plant it in poor soils and right to the end of the wet season despite repeated failures.

*Sorghum and Bulrush Millet.*—Despite the teaching of the Agricultural staff, these crops continue to lose favour, though they are more satisfactory in most respects for the local conditions than maize is. Nzega is the main producer, marketing 328 tons. Mtama is the staple food of the Kibondo people, but elsewhere it is largely used in beer making.

*Finger Millet (Eleusine).*—This is the main food of the Wafipa, and a fairly good crop was obtained this year, and 434·4 tons exported.

*Wheat.*—Two hundred and twenty tons of wheat and 1·8 tons of wheat flour were exported from Ufipa this year.

*Paddy.*—The Unyamwezi crops were rather poor as the rains were insufficient and badly distributed. No paddy came through the markets in Tabora as the growers can get much higher prices selling privately either as paddy or as hand-hulled rice. Nzega marketed 737·2 tons and Mpanda 668·2 tons. The Kigoma crop was a failure largely due to the overflooding of the Luiche Delta, and the Ufipa crop was poor.

*Groundnuts.*—Groundnut yields have been decreasing in Unyamwezi, probably an indication of soil erosion and general decline in fertility. The main producing area is Nzega, which marketed 1,275 tons.

*Bambarra Nuts.*—This crop is more dependable than groundnuts and is replacing the latter in certain areas. Nzega marketed 104 tons and Kahama 92 tons.

*Beans.*—The main producing area of mixed beans is Buha, which marketed 433·8 tons valued at Shs. 86,760/- to the growers. In addition a large amount of the Buha crop crosses the border into Urundi. The haricot crop was confined to the Makere area of Kasulu where 48 tons were sold for Shs. 10,570/-. Haricot beans have not been able to replace the local mixed beans.

*Other Legumes.*—The other legumes form a valuable part of the native diet and are locally important as cash crops.

*Pigeon Pea* is grown extensively in Kigoma and Buha and 64 tons were marketed.

*Cowpea.*—Kahama and Nzega produced all the cowpea marketed (190·6 tons) in the Province.

*Chick Pea.*—Chick pea is gaining in popularity especially in Kahama where 15·8 tons were marketed.

*Green Gram (Choroko).*—Kahama is the chief grower, marketing nearly 15 tons.

*Tobacco.*—Fire-cured tobacco has made a good start in Kibondo; in the first season 8,142 lb., valued at Shs. 3,501/- were produced. The crop for 1949 is estimated at 15 to 20 tons. 12·5 tons of coil tobacco were railed from Tabora stations, mainly from Usoke.

*Palm Oil.*—The Kigoma palm oil crop was 11·9 tons, valued at Shs. 10,676/55. The Agricultural Assistant, Kigoma, has been assisting the cultivators in thinning their plantations.

*Palm Kernels.*—There has been a dramatic rise in the Kigoma palm kernel industry. In 1946 the Field Officer, realizing the value of the kernels then thrown away, brought the question of marketing before the District Commissioner and Senior Agricultural Officer. As a result, the industry has made great progress and is likely to develop still further.

*Export.*—

| | | |
|---|---|---|
| 1946 | ... | 10 tons. |
| 1947 | ... | 192 ,, |
| 1948 | ... | 263·65 tons valued at Shs. 69,794/21 to the growers. |

*Sisal.*—The Msange Estate near Tabora has been reopened and has exported 256 tons in seven months of production. Kissengi Sisal Estate, Malongwe, has produced 950 tons during the year. Kazuramimba estate produced 99 tons. Laxmi estate, reopened in June, produced 159 tons, and Buhanda estate, reopened in September, 4 tons. The total sisal production in the Province was 1,478 tons.

*Onions* are gaining in popularity especially in Tabora and Nzega where the Agricultural Offices do a brisk sale of seed. Tabora stations railed 27·6 tons valued at Shs. 13,818/-.

*Vegetables.*—Some enterprising Africans near markets are doing very well as market gardeners. The Department has an active retail trade in selling vegetable seed.

*Gum.*—Nzega is the chief gum producer of the Province, exporting 223·75 tons valued at Shs. 89,500/-. Plague quarantine prevented the usual influx of hundreds of Singida gum collectors into eastern Nzega and so there was a reduction in output. Quality has much improved in recent years as a result of grading at the markets.

*Beeswax and Honey.*—1948 was an exceptionally good year for honey and beeswax. The quality of the beeswax is now fairly high, but any attempts made to improve the quality of honey by using cleaner methods of extraction and by not boiling have met with little success so far. There are two Instructors, one in Tabora and one in Kahama, engaged in teaching better methods of beekeeping and extraction of honey and beeswax.

The amounts railed from Western Province stations are as follows :—

| Beeswax | Kilos |
|---|---|
| Tabora stations ... ... ... ... ... | 260,528 |
| Bukene (Nzega) ... ... ... ... ... | 17,602 |
| Isaka (Kahama) ... ... ... ... ... | 46,737 |
| Kigoma stations ... ... ... ... ... | 79,612 |
| | 404,479 |

This at Shs. 5/- per kilo means Shs. 2,022,395/- to the Province.

## Pests and Diseases

*Red Locusts.*—The Entomologist, Mr. F. B. Notley, organized a very successful campaign against these locusts in their breeding grounds in the Ugalla-Malagarasi swamps and defeated at source an invasion which might have caused very serious damage. Part of the primary outbreak area in the Rukwa valley is in the Western Province.

*Bean Beetle* (*Hallirhotius africanus*).—This pest of legumes was very prevalent and was largely responsible for the very poor crops of pulses in Tabora.

*Stalkborer.*—This was not nearly so prevalent as in the previous season and did relatively little damage.

*Elegant Grasshopper.*—This pest does considerable damage to cassava at the end of the dry season, sometimes leaving no more than a waste of dry sticks in the field.

*Army-worm.*—Army-worm was locally prevalent during the rains and did some damage to young grains.

*Rats.*—Rats caused much loss in root crops particularly in Nzega.

*Large Animals.*—The most destructive of the large animals in the Province are pig, baboon and porcupine. The people, left to themselves, do little more than take some defensive measures and complain to officials. They have been encouraged in Tabora, Kahama and elsewhere to organize drives which have had considerable success. Occasional reports are received of damage to crops by hippopotami, elephants and other animals, but these are of local importance only.

*Birds.*—Finches cause great losses in some areas to the ripening grain.

*Parasitic Weeds.*—The campaigns in Unyamwezi against *Striga* and *Alectra* are having a noticeable effect in reducing these weeds, but they are still common. In Kigoma, dodder is locally common in cassava and people are being taught to uproot and burn it.

*Plant Diseases.*—Mosaic is very common in cassava. People are constantly being told by the Instructors to plant only disease-free material as a control measure. Rosette of groundnuts was comparatively uncommon this season. Close and early planting and uprooting and burning diseased plants are the control measures taught.

## Marketing

For several reasons, the Native Authority produce markets did not function as well as they should. In some places, there are excessive numbers of small buyers, with insufficient resources, who constantly run out of cash or gunny bags. As a result of this, the producers often have to carry their produce home again and naturally resent having to do this. There was some difficulty in Tabora markets caused by the wholesalers, who considered their profit margin inadequate and refused for a time to supply money and bags to the small traders at the markets. At some markets in Tabora the traders refused to buy sunflower seed, and the Senior Agricultural Officer and Agricultural Officer had to organize the buying at seven markets, bringing in 8·2 tons of seed.

The produce-market figures give only a partial picture of the produce sold by the natives. For instance, most of the sunflower was bought by approved traders either in or outside the markets, much of the cassava was bought when the markets were closed, and much of the paddy was sold privately either as paddy or hand-hulled rice. Assistance was given to the Administration in the running of the Native Authority markets by inspection, and supervision whenever possible. A market was opened at Kasulu to buy the sunflower crop and the maize growers of the Malagarasi delta were helped in the disposal of their crop.

Figures of produce passing through the Native Authority markets are shown in Annexure I.

## Estate Agriculture

Help was given by the Agricultural Officer, Tabora, and Agricultural Assistant, Kigoma, to the estates in their districts whenever it was requested. Missions, schools and prisons were also visited to help with their farms and gardens.

## Agricultural Stations

### TUMBI

Tumbi Agricultural Development Centre was only partially successful this year in fulfilling its objects as an experimental station, a seed producer and a demonstration farm. The reasons are not far to seek. (a) Owing to the menace of tsetse there have been no cattle at Tumbi all the year, and their manure and work have been lost. (b) There was great difficulty in obtaining labour especially in the wet season. (c) There were severe depredations by animals. These difficulties are gradually being overcome: clearings made by the Agricultural Department and later by the Tsetse Reclamation are reducing the numbers of tsetse by destroying favourable environments. Extramural prisoners have also assisted and augmented the supply of "wazuduka" for the peak cultivation periods. "Wazuduka" are bands of men who cultivate for hire. A double sisal game-fence has been planted between the farm and the bush country to the north and west.

There is a great demand for seed from Tumbi, much more than the farm can supply. Pig-resistant "Liongo" cassava is particularly popular. There has been little demand from chiefs for flowering and fruiting trees, but supplies have been sent to the Overseas Food Corporation, Urambo, the Native Hospital, to a few Barazas and to Europeans who have asked for them.

Good progress has been made in the buildings made under the Development vote. The following buildings are completed: two headman's houses, double boys' quarters, four latrines, four kitchens and twelve concrete storage bins.

The kitchen and garage at the manager's house have been re-roofed. The old tool shed, cattle-shed, boys' quarters and latrines have been demolished. Money from the Development votes has been used also in bush-clearing, road-making, and for increasing the rice valley.

One of the work oxen died of trypanosomiasis, leaving twelve. As the usual training of oxen and men for the plough could not be done at Tumbi, the ploughmen and oxen were sent out to demonstrate and teach ploughing in Uyui, Ugalula and elsewhere and they also assisted in dam-making.

A meeting of the Tumbi Committee was held in November when the Agricultural Officer explained the work done and asked for directions for future work.

MWANHALA

Considerable progress has been made in building both with Development Funds and with money provided by the local Creameries Board for the stock farm.

*Development Vote.*—The headman's quarters, workshops and implement shed, begun in 1947, were completed; a rest camp, kitchen and latrine were built, and a new overseer's house and outbuildings completed. The paddocks were stumped and cleared of regenerating bush, and about sixty acres of land between the fly bush and paddocks were cleared and partly stumped. The farm was surveyed and laid out in square blocks, and roads made between the blocks.

*Stock Farm.*—An African veterinary assistant's house and a double headman's quarter, each with outbuildings, were almost completed, and the foundations of the stock-buildings laid. Some of the buildings are made with burnt brick made on the farm. Work continued on the stock farm dam and the two existing dams were enlarged.

*Crops.*—The total rainfall for the season was the lowest since 1943 but the distribution was good and the crops were big for this district. There is an increasing demand for seed and planting material from Mwanhala. Crops are grown which meet the local requirements of the people, for example pig-resistant cassava, bird-resistant bulrush millet, sunflower, clean varieties of paddy, and suitable varieties of groundnuts, sorghum and pulses.

*Stock.*—There are one hundred and two head of cattle. Four died of anthrax in November but otherwise the condition of the herd was good. The pigs, three sows and a boar, remained in good condition but the second litter of piglets died of anæmia due to severe tick infestation. Measures have been taken against the anthrax and anæmia.

SUMBAWANGA

A site was selected for the Agricultural Development Centre; it was mapped and the possibility of irrigation examined. No clearing nor planting was done but a start will be made in 1949.

KAHAMA

A site has been selected near Kahama for the sub-station, a map made and contour banks built. A dam has been built, and rice fields laid out. Some bush clearing has been done in the grazing area. Sixteen oxen were trained for the plough and were used for dam making and other work.

SUMMARY OF EXPERIMENTAL AND DEMONSTRATION WORK

*Tumbi.*

*Sodaphosphate Experiment.*—There was a significant increase in yield over control both with single and double dressings of phosphate. There was no significant increase in yield due to sulphate of ammonia nor to sulphate of potash.

*Fallows.*—All the fallows tested—Pigeon Pea, Elephant Grass and local grasses—are significantly superior to continuous maize (control) but there were no significant differences between treatments.

*Manurial.*—Three tons of boma manure every three years versus one ton every year—no results will be obtainable till 1949.

*Stalk-borer.*—A big experiment to test the effect of D.D.T. dust and gammatox solution applied in the funnel of maize had no significant effect on stalk-borer infestation.

*Mosaic Resistant Cassavas.*—The ten Amani and one Bagamoyo mosaic-resistant cassavas are doing well. Only one 405/1 shows any symptoms of mosaic. They have, however, suffered severely from pig which leave the local "Liongo" almost untouched.

*Beehives.*—No significant results have yet been obtained from the experiment at Tumbi and Kitunda testing queen-excluders in hives.

*Mwanhala.*

*Sodaphosphate.*—Both single and double dressing of phosphate gave a significant increase in yield over control. Sulphate of ammonia by itself gave no significant increase but a marked increase in yield when mixed with sodaphosphate. Sulphate of potash by itself and with a single dressing of sodaphosphate increased yields significantly.

*Fallows.*—At Mwanhala, all fallow treatments gave a big increase in yields over control, but only Pigeon Pea and Elephant Grass were significant, and Elephant Grass resulted in a significantly greater yield than the local grass fallow.

*Pit compost v. Rock Phosphate.*—This year, the third residual year, both single and double dressings of compost and rock phosphate gave increases in yield over control which were just insignificant.

*Ridge Cultivation.*—The results from this experiment testing various sizes of ridges against flat cultivation are still inconclusive and the experiment is to be re-started in 1949.

*Stalk-borer.*—Here, as at Tumbi, the D.D.T. and gammatox treatments gave no significant decrease in stalk-borer infestation. A trial at Ussongo chiefdom was also inconclusive.

*Other Experiments.*

*Onion Seed Production.*—Three tons of onion bulbs were bought in Mabama (Tabora) and distributed to Ufipa, Kasulu, Makere and Tumbi for a trial to test seed production possibilities in the Province. Mwanhala will also be tried as a seed producing area.

*Oil Palm.*—The Congo pedigree seed in the Simbo nursery at Kigoma germinated well. Ten acres of land have been cleared and 350 trees planted out. Small trials at Tumbi and Mwanhala were not so successful but there are several young trees which will serve as a seed supply for future planting.

## Soil and Water Conservation

Anti-erosion teaching has been the least successful part of the department's work. Apart from a few minor improvements here and there, there has been little effect from the teaching and demonstrations. The people have not yet learned that the extra work of tie-ridging is worth-while even as a short-term policy. The three scheduled areas in Tabora, Nzega and Kahama are little better than the surrounding areas as the native authorities are reluctant to punish offenders. People have even moved out of the Tabora scheduled area rather than follow the simple anti-erosion measures demanded. The Department supervised conservation measures in the catchment areas of the Itobo and Ulaya dams in Nzega where erosion was severe. Seventeen thousand six

hundred and nineteen yards of eight feet contour banks were made at Itobo and 1,200 yards at Ulaya. One Departmental and three Native Administration Instructors are permanently employed in Nzega marking contour lines for the natives to follow in their cultivation ridges. A start was made in soil conservation demonstrations and contour banks in the Buha Highlands. Mr. Linton, Senior Agricultural Officer, prepared a comprehensive report of the Buha Highlands in preparation for the proposed soil-conservation scheme there. At Tumbi and Mwanhala, tie-ridging is standard practice, and erosion is reduced to negligible quantities. The supplies from the water holes are said to be better since contour banking and tie-ridging have been done.

The yearly manuring campaigns are becoming less arduous in Unyamwezi as the people realize the value of manure. The next step, which is just beginning, is the collection of crop-residues in racks to feed and bed cattle in the bomas and so increase the amount of manure.

### Dams for Rice Growing

Fairly good progress has been made in Tabora and Kahama districts in the making of dams for irrigating rice-land during dry spells in the wet season. The following dams were made :—

| | | Volume | |
|---|---|---|---|
| Tabora : | Igalula ... ... ... | 2,000,000 gallons. | |
| | Kilawili (Igalula) ... ... | 1,500,000 ,, | |
| | Itaga (Karunde) ... ... | 1,000,000 ,, | |
| | Kakora (Ibiri) ... ... | 3,200,000 ,, | (unfinished) |
| Kahama : | Uyogo ... ... ... | 2,000,000 ,, | |
| | Lugela ... ... ... | 500,000 ,, | |
| | Ngogwa ... ... ... | 1,500,000 ,, | |
| | Ukune ... ... ... | 1,000,000 ,, | (enlarged). |

It is unfortunate that this season, when the suspicions of the people have been dispelled, there should be insufficient rain so far to fill the dams. People are now keen on the dams and there are several requests for more to be built. The Rice Mission was favourably impressed by the dams.

### Agricultural Education and Propaganda

Six students returned from Ukiriguru to the Province in 1948 and nine remain at the school. The Western Province students have acquitted themselves well in the course.

The field-instructors concentrated on implementing the policy of increased crop production without reduction of fertility. To this end they pressed for full use of available manure, anti-erosion measures, destruction of weeds, vermin and diseased plants, early and close planting, rotation and other good farming practices.

Very successful Agricultural Shows were held at Nzega and Kahama.

Visits from chiefs, schoolboys and others to Mwanhala and Tumbi have been encouraged to explain our work and purpose in the hope that they may carry some of the lessons home with them. Talks have been given at schools by both European and African staff and the children appeared to be most interested.

### Building Work

Apart from the building done at Tumbi and Mwanhala, there has been considerable activity in building by the Department in the Province.

*Sumbawanga.*—The Field Officer and Agricultural Assistant have built a house at Sumbawanga. When it was nearly complete, it was burned and the

roof and door and window-frames destroyed. Mr. Yeo has had a hard task re-roofing it sufficiently to protect it over the wet season and it will be finished in 1949. Fairly good progress has been made in the building of the sub-station. The seed store and implement shed are complete.

*Kibondo.*—A house has been built for the Agricultural Assistant Kibondo. Instructors' houses have been built in Tabora, Mpanda, Kigoma, Kibondo. The seed store at Makere has been re-roofed.

*Kibondo.*—A house has been built for the Agricultural Assistant, Kibondo. built an instructor's house and the Native Authority has built a headman's house and cattle boma.

### Botanical

There is now a fairly extensive collection of grasses at the Provincial Office and a herbarium cupboard has been made to house it.

### Resettlement

Assistance was given by the Department to the Administration in re-settlement schemes at Ugalla (Tabora) and Uyovu and Diobahika (Kahama).

Murray Lunan,
*Provincial Agricultural Officer,*
*Western Province*

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*Annexure I*

| Produce | Produce Marketed 1948 Tons | Produce Marketed 1947 Tons | 1948 Approximate Price to Producer Shillings |
|---|---|---|---|
| Maize ... ... ... ... ... | 3,438·3 | 2,203·3 | 481,362 |
| Millets (Mtama and Mawele) (3) ... | 1,571·5 | 1,632·6 | 194,295 |
| Finger Millet (4) ... ... ... | 434·4 | — | 65,160 |
| Mixed Grain (4) ... ... ... ... | 340·0 | — | 40,800 |
| Paddy and Rice ... ... ... | 1,983·5 | 3,933·6 | 396,700 |
| Groundnuts ... ... ... ... | 2,465·8 | 3,785·6 | 813,714 |
| Bambarra nuts ... ... ... ... | 196·2 | 404·1 | 43,164 |
| Cowpea (Kunde)... ... ... ... | 190·6 | 888·5 | 41,932 |
| Pigeon Pea (Mbaazi) ... ... ... | 66·1 | 91·4 | 14,542 |
| Green Gram (Choroko) ... ... ... | 16·3 | 9·7 | 3,586 |
| Chick Pea (Dengu) ... ... ... | 16·3 | — | 3,586 |
| Beans (Mixed) ... ... ... ... | 475·8 | 512·4 | 95,160 |
| Beans (Haricot) ... ... ... ... | 48·0 | 75·4 | 10,570 |
| Sunflower (3) ... ... ... ... | 170·4 | Nil | 56,232 |
| Sesame ... ... ... ... ... | 3·9 | 4·4 | 1,287 |
| Cassava (3) ... ... ... ... | 4,768·0 | 1,034·8 | 524,480 |
| Cassava Flour ... ... ... ... | 1,674·2 | — | 200,235 |
| Tobacco (Fire-cured) (1) ... ... | 8,142 lb. | Nil | 3,501 |
| Palm Oil ... ... ... ... ... | 11·9 | 34·4 | 10,676 |
| Palm Kernels ... ... ... ... | 263·6 | 207·2 | 69,794 |
| Sisal (2) ... ... ... ... ... | 1,478·0 | 1,047·0 | 1,773,600 |
| Onions (3) ... ... ... ... | 28·3 | 18·6 | 113,200 |
| Wheat (4) ... ... ... ... | 221·9 | 31·4 | 55,475 |
| Honey (3) ... ... ... ... | 96·0 | 33·9 | 53,760 |
| Beeswax (3) ... ... ... ... | 404·5 | 190·6 | 2,022,395 |
| Gum (3) ... ... ... ... ... | 314·0 | 244·5 | 125,600 |
| Potatoes (4) ... ... ... ... | 3·7 | 26·6 | 740 |
| Total ... | 20,684·8 | — | 7,215,546 |

(1) Nyamirembe return
(2) Estates return
(3) Railings
(4) From Ufipa export permits.

# LAKE PROVINCE ANNUAL REPORT, 1948

## General

The year has been chiefly notable for the second largest yield of cotton and deliberations over the provision of considerable extra staff under what is to be called the "Cotton and Food Production" scheme. Twenty-three tons of sunflower seed were distributed. It was an entirely new crop, and the sale of 330 tons was a surprise to all concerned. The Sukumaland Development Team of four with a staff comprising Stores Officer, Superintendent of Works and his assistant, Mechanic and Assistant Mechanic and Accountant have settled down and most of them are now housed. The lack of field staff is one of the chief reasons for the slow acceptance of new agricultural methods by the people, but the position was slightly relieved at the end of the year by the arrival of an Agricultural Assistant for Kwimba District and another for Mwanza.

Mr. Swynnerton demonstrated during the interregnum that the three major cash crops of the Lake Province were all in process of decline.

On the basis of five-year running average paddy and cotton reached their peak in 1943, and coffee in 1939. This decline has been compensated by increased prices, which has masked the true position. The programme of work for the Bukoba Native Coffee Board is designed to increase production by providing seedlings and supervision and a fixed price for the District, amongst other things. The "Cotton and Food Production" scheme involves a large increase in staff to apply proved agricultural measures in the peasants' fields. The rice dams construction scheme is a counter to the falling water table of Sukuma as demonstrated by dried-out springs and water holes and marginal rice dams. Oxen have been trained and implements obtained and a tractor is to be ordered.

## Weather in Relation to Crops

The season was characterised by rather short planting rains of rather intermittent precipitation followed by a long beak in January and February. In Bukoba the coffee crop suffered as a result, particularly Arabica. The long rains were however inordinately long but on the other hand not too heavy, and good crops resulted.

## Details from the Districts

(A) *Food Crops.*

Food supplies were sufficient. Cassava was maintained under pressure in Biharamulo and Ngara. Bananas did well in Bukoba and consequently there was a surplus of other foodstuffs for essential services and export. Cassava planting is being extended in the Maswa and Shinyanga Districts. It is possible that tie-ridging in the marginal areas will help to establish cassava as it would appear to give it a much better chance to carry over the dry season in a healthy state.

The rise in the price of cotton indicates that not only bad weather reduces the acreage of food crops.

(B) *Cash Crops.*

In *Biharamulo* a record crop of 110 tons of firecured tobacco was produced. The yield per acre increased from 94 kgs. to 140 kgs. approximately.

The *Ngara* coffee crop amounted to only 58 tons; a measure of the very high infestation of Antestia. The tobacco of Busubi, where it is still rather a strange crop amounted to seventeen tons.

The poor return from Arabica Coffee in *Bukoba* resulted in a crop of just less than 6,000 tons altogether. Most of the Arabica blossom was swept from the trees by heavy rain in 1947, and the remainder of the crop was again damaged by drought in January and February of this year. Maize production fell from 1,500 to 1,000 tons and the decline will continue into 1949. The European potato crop rose to 380 tons. Prices of pulses have risen and together with indifferent marketing facilities for the maize crop are responsible for this drop in production. The big effort to increase Soya Beans came to nothing owing to the drought early in the year, but another effort later in the year is likely to bear fruit. There were however 1,200 tons of beans surplus to requirements.

The *Musoma* cotton crop amounted to 2,113 bales. A welcome increase in groundnuts was recorded from 172 to 484 tons. Growers are keen and sales should increase in 1949. Maize production in *North Mara* fell short by 100 tons of last years' record of 2,500 tons. One hundred and thirty tons of Sunflower were sold.

In *Sukumaland* a big crop of cotton was harvested. Out of the total crop of 45,129 bales (including Musoma) Mwanza District was responsible for the record quantity of 25,361 bales. The total cotton crop was worth £690,000 to the African. The paddy crop for which Mwanza is again largely responsible was considerably less than 1947 amounting to 7,157 tons. The late-planted seedlings of March were able to mature owing to the protracted rains. Groundnuts are unlikely to gain a prominent position in production again unless the price is brought into line with that of cotton. This is unlikely as in addition to the oil seed a fibre is produced from the latter. Arrangements should also be made for the reservation of seed in village granaries as availability of seed is often the controlling factor. The production from Sukumaland together with Musoma was only 1,600 tons. Chick pea remains an extremely popular crop at the price of twenty-two cents per lb. This price is nearly as much as that for cotton. Production increased to 2,330 tons and will continue to expand with the increasing number of ploughs: preparatory cultivation is often undertaken by pick axes. Sunflowers have proved popular, often as a back-garden crop, but also on a bigger scale. It has shown a remarkable adaptability to the various types of soil. It grows well even with indifferent preliminary cultivation and requires only one weeding. One hundred and sixteen tons were bought in Sukuma, making a total of 330 tons for the Province, which is a commendable beginning.

(C) *Food Storage.*

The Native Authorities favour village reserves which are good in their way but not strategically valuable for distribution elsewhere during the rains. Three hundred and thirty-three tons have been collected in this manner in Maswa; in Shinyanga, it is reported that they have installed some big bins at chiefs' and sub-chiefs' Headquarters. In Kwimba they have abandoned these and gone back to village stores. The chief merit of a central grain reserve is that the quantity on hand is known at any time.

(D) *Improvement of Seed Supplies.*

Progress in the purification of the rice seed supply in Mwanza District by the distribution of "Kahogo" and "Kilombero 1/18" was hindered by price control difficulties finally only "Kahogo" was purchased at a higher price and Kilombero is of course not popular as the price does not differ from that of mixed paddy. However about 400 tons of pure Kahogo was marketed. A further

eighty bags were distributed to centres in Mwanza and Kwimba for planting in 1949. It is expected that a very large proportion of the Mwanza crop will be pure in 1949. Now that a Botanist is stationed at Ukiriguru we may expect some better strains to come forward to replace "Kahobo" in time. One and a half tons of pure Afaa from Ukiriguru was exchanged in Majita with good effect on the quality of paddy produced.

Six thousand growers in the Bukibikiso peninsula planted 1,000 acres with UK 46 cotton seed. They planted at the rate of 26 lb. of seed to the acre. The average yield was 650 lb. per acre and 188 tons of seed was produced which was distributed at the end of the year to the whole of the Mwanza zone except the area round the ginnery. Seed was also sent to Kome Island. Thirty pounds of seed is available per person to be planted at five seeds per hole instead of the 20-30 the cultivators like to put in.

| | UK 46 | UK 48 |
|---|---|---|
| 1946 ... | 103 acres 14 tons. | |
| 1947 ... | 1,000 ,, 188 ,, | ex-Ukiriguru 1½ tons. |
| 1948 ... | approximately 10,000 acres | 216 acres |

The seed of UK 46 will suffice for Sukumaland either in 1950 or 1951 depending upon weather conditions and whether cultivators are willing to be economical with seed.

Planting material of the Amani mosaic-resistant strains of cassava is being issued to six acres of communal plots in each of the Sukuma Districts for further multiplication. An experiment was laid down at Ukiriguru to test the relative yields of these strains, which are showing good resistance to mosaic and must give very considerably higher yields than the existing local types riddled with the disease.

(E) *Improvement of Farming Systems and Cultural Practices.*

Work continues to improve methods of banana culture in Ngara and Biharamulo, in the former area with considerable success. The theory that beans will not grow through sorghum straw has been exploded. Germinating beans penetrate the overlying straw or banana leaves quite satisfactorily, and the mulching, of course, reduces weeding to a minimum. One thousand one hundred plots of coffee were converted to multiple stem in Ngara, in addition to 17,000 trees converted last year.

In Bukoba it has been decided that grass need not be applied as mulch where sufficient banana trash is available for both bananas and coffee.

Year by year greater strength is given to our propaganda for rotation of crops by results from Ukiriguru, but the peasantry do not readily change their methods. Two years of grain cropping after three years of cassava with weeds growing beneath it, showed an increase in yield over continuous grain-cropping. Sorghum benefits from a previous crop of cotton. Yet it needs personal attention to every individual's field just at the right time (before he plants it) to get the desired result. Simple alterations in practice involving no extra work however should be adopted fairly quickly.

(F) *Soil Conservation and Soil Fertility.*

Nine thousand plots were hedged with *Coleus* in Ngara this year. Musoma District receives the laurels for tie-ridging. The Majita peninsula has been concentrated on with good results. The African Agricultural Assistant, North Mara, reports as follows:—

"The use of grass and trash lines to check run off on cultivated land has become popular and striding levels are now used to get the lines

on the contour. There are at present ten striding levels which have been issued to the ploughing instructors who are working in two teams one operating in Kuria and the other in Girango".

The North Mara Native Council agreed to make manuring compulsory. Tie-ridging was put in some of the cassava plots in Girango and Suba, but it has not yet been generally adopted.

In Sukumaland the practice of tie-ridging made a big advance. Its value is much better appreciated. The tie-ridging was better done and much larger acreages were cultivated in this way. In most villages a cultivator will be found now who will support it in argument in public. This is a big gain. Pressure was placed on the tie-ridging of cassava and cotton, not grain. In any case it is thought that grains do not respond in terms of increased yield quite so well, although the soil conservation value is of course equal in all crops. In parts of Shinyanga and Maswa a jump of two stages was made from flat to tie-ridge, which is a commendable effort. Whilst the Agricultural Officer, Mwanza, reports that tie-ridging is now done as a matter of course by many people when planting cassava, if only to increase the size of the fields by planting cuttings on the ties, I think it can be said that as many use this method because they reap better crops.

An attempt was made to reduce the acreage of cotton in Ukerewe by insisting on all of it being tie-ridged. The acreage remained the same, and the instructions were followed to the letter. It is hoped that the chiefs will agree to all cotton being tie-ridged in 1950. Good work was done in Ukerewe in 1947 marking with sisal the margin of two yards each side of gullies which has to be left uncultivated. Most of these marks were uprooted and burned or transplanted by the Wakerewe, in their desire to use every foot of cultivable land. The use of grass strips is becoming almost a habit in North Mara, but unfortunately public opinion at the moment keeps them down to a width of only two yards instead of five yards which is the rule for Sukuma, or equal widths of grass and arable which of course is the foolproof ideal. The grass-strip rule was well followed in the Sukumaland Development Pilot Rehabilitation area of Mwamashele, due to the influence of Chief Kidaha and the whole time residence of a Field Officer. The grass strips have now been extended to the north side of the Tungu river in Buduhe Chiefdom and have also been re-measured by the African Agricultural Assistant, Maswa, in South Mwagalla, where last year the order was not properly observed. Slowly the strips are being marked with sisal and aloes. Cultivators in Mwamashele have agreed to put one arable strip in each field down to grass.

(G) *Eradication of Weeds.*

Striga was not too severe this year owing to the small rainfall.

A striga day every week was practised in Sukumaland. Nothing further has been done about *Opuntia*, as parasites are awaited from South Africa. Investigations of *Penisetum catabasis* (better known as *Aristida*) are to begin in earnest in 1949, but useful observations and a map of its distribution were made during the year by the African Agricultural Assistant.

(H) *Water Conservation.*

In Musoma three dams were completed. In North Mara dam sites were listed and a big programme of dam construction, especially for the expansion areas, has been drawn up awaiting the recommendations of the Water Development Department. Three small tank dams were sited and measured by the

Agricultural Officer, Mwanza, in Nassa chiefdom at the request of the chief. Two large tank dams were begun on Ukerewe Mainland. Two, for rice fields, were also dug in Karumo by oxen and dam scoops including some leading-in furrows.

It has again been a year of surveying of water sites in Sukumaland as the machinery of the Construction Company contracted by Water Development did not materialize. A chain of supplies in Busambiro was examined and surveyed in detail by the Water Development Department in anticipation of the machinery for Sukumaland Development being available in 1950. Numerous dams or hafirs were excavated by Sukumaland Development or District Teams, one or two with the help of Malya's machinery comprising a Fordson, a D4 and rotary scraper and sheeps-foot roller.

The emphasis in almost every district is on water, either for expansion of population or for reducing movement of stock or providing new grazing grounds. The examination of these needs is quite beyond the limited staff of the Water Development Department and there is a consequent big hold-up in plans albeit coincident with a delay in the arrival of machinery, though much work can be done by hand. Oxen were purchased and trained for use with dam scoops and will begin the excavation of water supplies for rice in earnest in 1949.

(I) *Land Utilization Planning.*

In order to prepare the way for large-scale rehabilitation, as a beginning certain areas have been selected for pilot schemes in which to try out methods and gain experience with the limited staff at present available. Two areas are essentially pilot rehabilitation areas of the Sukumaland Development Team, i.e. the Busiha and Buduhe "Ibushi" soil in Shinyanga, and the Mondo area in Kwimba District. Two other areas are being attended to by the Mwanza District Team, i.e. Bujashi in Nyanza Federation twelve miles from Mwanza town, where an area of three square miles of watershed has been selected, and the Bukumbi and Nyegezi chiefdoms which together have been made the subject of a "Concentration of staff" pilot scheme, on much the same lines as suggested for the "Cotton and Food Production" scheme. North Mara, which lead the way in preparing its own district plan and providing its own funds for equipment, in the absence of earth-moving equipment for dam digging, has concentrated on communications, buildings, and tsetse reclamation. It is in process of producing a development map.

The Mwanza District Team has functioned throughout the year with regular monthly meetings. No other district has so far been provided with representatives of all the Natural Resources Departments.

(J) *Expansion Areas.*

Six hundred and fifty families equal to 16 per cent of the population in the Majita peninsula have moved into the Suguti clearing under a system of controlled block settlement. There is room for as many more, and then there is another area which may be opened up by water supplies. It is forbidden for the abandoned arable lands, except rice lands, to be taken up by those who still remain in the peninsula. Busambiro in Mwanza District is considered to be the first area for development on a large scale by the Sukumaland Team. The control of settlement maintained by the Native Authority in so-called closed areas is very lax and unsatisfactory. A system of control by Land Bailiffs is being developed. They work under the Native Authority but

their work is limited to settlement control. The Sukumaland Team have examined most of their expansion areas and some have been surveyed.

(K) *Development of Sukumaland.*

The "Team" functioned for over half the year. Their duties are now too formidable to be mentioned adequately in this report. We have received special assistance from them in testing out tractors and implements with a view to ordering suitable equipment for cultivation purposes for the "Cotton and Food Production" and the construction of rice dams schemes. There was regular consultation between them and the Natural Resources sub-committee of the Provincial Committee. The Busiha and Bududhe "Ibushi" soil rehabilitation area to which is posted a Field Officer from Malya has as a result of the reduction in the numbers of people and stock, regained some vegetation and an appearance not dissimilar to that with which it started after the original clearing was done. All requirements have been fulfilled in the Busiha area including grass strips, tie-ridges, and grazing reserves and the results are striking.

(L) *Training of African Instructors.*

The Ukiriguru consists mainly of temporary school buildings. Construction is still behind schedule but facilities within the existing buildings show some improvement. A recreation room and library were provided for students who formed a welfare club with monthly subscriptions. The club is now self-supporting and self-organizing.

Since April, 1947, there has been a steady improvement in discipline and general administration under the headmaster. There is a better spirit among teachers and pupils alike. The school suffers from its having to teach instructors of varying standards from Standard VI to X and although each course was divided into three classes of twenty, each of different standards, a different syllabus had not been worked out for each class and it was left to the teachers to modify their lectures accordingly. It is now proposed to arrange for a different syllabus for the lower standards. Fifty-three men completed their course in September.

(M) *Pests and Diseases.*

The Entomologist paid a visit to Ngara and gave us much-needed advice regarding *Antestia*. The infestation is a very heavy one. D.D.T. spraying was recommended. Trials are under way and if successful, it is hoped that the Co-operative Society will support a plan for financing twice-yearly spraying, with, perhaps some initial outside assistance.

In Bukoba, Native Authority legislation was approved for the control of Banana Weevil. The pest has now spread to all chiefdoms, but only when a drought intervenes will cultivators realize the extent of the infestation. It continues to spread along the Mwanza lake shore. Berry Borer Beetle and *Stephanodores* have been kept under control by constant supervision and prosecutions. Even amongst the most advanced of the coffee growers this pest-control work is not carried out voluntarily despite the obvious loss. A determined and organized attempt to control stem-borer has met with success.

Pink Bollworm was prevalent in Ukerewe and cotton up-rooting had to be rigorously enforced, jassid and aphis were not serious this year. A scale on cassava is fairly widespread in Ukerewe. "Blast" disease was reported in *Eleusine* in North Mara. This is the first record of its occurrence on this

crop in Tanganyika. It normally occurs on rice. Blackarm on cotton was serious and widespread.

(N) *Demonstration.*

The Agricultural Officer, Bukoba reports "We are aiming at one coffee demonstration plot per village, and more if we can get the growers to co-operate, in order to illustrate the full benefits of our instruction in regard to this crop. Spacing, mulching, regeneration, handling and pest control are each essential to crop production, yet the failure of any one measure is enough to spell failure for all the others. One of the main difficulties we have to meet is to get the grower to apply all these measures, yearly, at the optimum period, in order to give him the maximum advantage. We have however, achieved some success!

Useful ploughing demonstrations were undertaken by the African Agricultural Assistant in North Mara at twenty-five different places. The District Demonstration plots were continued with varying success in Sukuma, North Mara and Ukerewe. Whereas the desire for money was sufficient to induce the Wakerewe to tie-ridge their cotton rather than have no cotton at all, the prospect of tax-ticket and Shs. 80 - cash together with all the crop from three acres of the cultivators' own land was insufficient to encourage ten of the thirty plot-holders to undertake satisfactorily the simple agricultural operations required of them. But, at the least, there are twenty people who are carrying out all three measures of conserving their soil, fertilizing it, and rotating their crops. One of them might act as tinder to the fire one day. The Crop Supervisor, Nyamahona, makes the following observations on the grazing blocks :—

> "For three successive years the 'Itogoro' soil plots have not produced sufficient herbage for grazing, after two months of the dry season. 'Itogoro' mbugas, therefore, cannot support stock with all-the-year-round grazing even if the stock density is low. The herbage on the 'Itogoro' plots is of inferior quality. The cattle prefer to graze on the higher parts where the 'Itogoro' is mixed with 'Iseni', and only graze the lower parts when no choice is left."

(O) *Experimentation.*

Ukiriguru Experimental Station continues to provide us with practical advice as to improvements which are possible in local agriculture. Very close contact is maintained between the field and the station staff. Extracts from the summary in the Progress Report detailed hereunder show what great value is to be attached to such relatively simple measures (in terms of labour involved), as rotation with grass, legumes, cassava and cotton. Unless otherwise stated all treatments are tie-ridged, which involves burying such crop residues and weeds as are left after taking the bulk to the stockyards.

(1) On the hill-sands, second and fourth year benefits in cropping from rest under elephant grass, were mainly absent. Rest under pigeon-pea, and under cassava allowed to go weedy, showed small but significant second-year responses in cropping. On the black loam, the post-grass benefit was small but still present in the third year.

2. Responses from compost and farm-yard manure were as usual big and with a marked residual effect on the Ukiriguru hill-sands and on the not dissimilar soil of the District Plot at Bututwa : they were small on the Lubaga black loam.

3. At Ukiriguru in an N.P.K. trial on a heavy yielding cotton crop, the effects of N and P although comparatively small were significant.

4. On Ukiriguru the yields from good ridges tied compared with poorer ridges not tied were up to 20 per cent higher for cotton, more for maize; and on Lubaga tie-ridging as contrasted with flat cultivation led to yield increases varying from small to very large.

There were other interesting results:—

(a) Splitting of the ridges is the routine method of preparing land for annual crops on the hill-sand soils such as those of Ukiriguru. The splitting is a laborious operation. An attempt to measure the benefit, made last year, using millet on split and non-split ridges gave inconclusive results as, after a bad start, the non-split treatment drew level with the split treatment in final yield. Weeds were troublesome on the non-split ridges. This year, with cotton, on a new site, there was no doubt: the final figures were 595 lb. per acre seed cotton for non-split ridges against 1,058 lb. per acre for split ridges = 100 : 177.

(b) Groundnuts on the flat at Lubaga gave 1,000 lb. per acre unshelled as compared with 1,590 lb. per acre in the tie-ridged treatment.

(c) Some measure of the value of good cultivation methods can be gained from the yields of exhaustion plots. Tie-ridged unrotated exhaustion plots which have been continuously cropped with the crop mentioned for the period mentioned:—

| | | |
|---|---|---|
| Cotton Ukiriguru 9 years ... | 700 lb. | per annum. |
| Cotton Lubaga 13 years ... | 815 ,, | ,, ,, |
| Groundnuts unshelled ... | 1,540 ,, | ,, ,, |
| Sorghum (Dobbs) ... ... | 910 ,, | ,, ,, |

(d) The average yield of the better cotton strains in the fourteen cotton extension plots cultivated by Africans scattered through five districts was over 1,000 lb. seed cotton per acre at 24 cents per lb. = Shs. 240/- per acre. The standards of cultivation are of course much lower in the plots of most Africans.

Unreplicated planting-date trials were undertaken on Tarime Seed Farm, North Mara, with Sunflower and Chickpea. Chickpea is unsuitable in whichever month it is planted. Attempts to show that seed of *Pennisetum catabasis*—the noxious pasture weed on North Mara is carried by cattle from pastures composed of this grass, or by manure from areas where the grass grows, have so far failed. Trials continue with sunflower up to the main planting rains.

Results from District rice experimental plots on different soils in the Mwanza District again, proved the superiority of "Kilombero 1/18" over "Majimaji" and that "Kahogo" is as good as "Afaa".

(P) *Propaganda and contact with the peasant.*

By the end of the year there was an agriculturalist in each district of Sukuma and as new officers become accustomed to conditions a closer approach can be made. Up till now contact has been generally rather superficial. The report of the Cambridge Summer School Conference on "stimulation of initiative in the African", laid great stress on the importance of the type of approach, particularly recommending that of the indirect type. It takes staff and time, however, and patience. The only European Staff we shall have for this sort of work will be new men. It will take all the time of the experienced officers to put these men right as regards propaganda and approach.

The African Agricultural Assistants did good work in contacting the peasantry at informal meetings in the fields where the peasants talk freely. They have had experience of the method of indirect approach during their spell in the Mwanza District in 1946-47. The African Agricultural Assistant, North Mara, held six agricultural shows in different parts of the district which were a success and helped to establish better contacts with the people.

(G) *Grading and Marketing.*

The Nyamirembe Native Tobacco Board came into being during the year, composed of the Provincial Commissioner, Senior Agricultural Officer, District Commissioner and two Africans as members, with the Tobacco Officer as Manager of the Board. The assets of the No. 2 account of the Native Treasury were taken over amounting to £10,000. Plans were drawn for new buildings for processing the crop and money voted for the purpose. The Board sold the whole crop to the East African Tobacco Co., Ltd., Kampala. The Tobacco Officer reports that :—

> "The quality of the crop was very similar to that of 1947. The chief fault remaining to be corrected is in the firing of the tobacco. Too much is still coming into the markets under-fired, and whilst this type of tobacco is acceptable on the local markets, it would be very unpopular on the overseas markets. The Board purchases, processes, and sells the crops of both the Ngara and Kibondo Districts and the Manager undertakes such technical supervision of the crop in those areas as may be necessary."

The Bugufi Coffee Co-operative Society intended to erect a blast separator to grade the crop by machine thus reducing the arduous work hand-grading entails to the grower, but the expenditure required for spraying against Antestia precluded this outlay.

The Bukoba Native Coffee Board concluded contracts with the zonal agents and the processers at the curing works. Towards the end of the year there had to be some alterations in price to bring Bukoba prices more into line with those of Uganda and the opportunity was taken to pay a fixed price for the whole district instead of deducting transport charges as hitherto. This was a popular move and will, of course, encourage production in the distant areas. The Board ended the year with a balance of £68,000. The Board has voted £1 per ton towards a Coffee Cultivation Fund Reserve which is principally intended to provide for the production of seedlings to replace dying and dead Arabica trees and for new planting. A cadre of Instructors is being built up too from this Fund. The Coffee Board of Tanganyika have voted an annual sum to provide the salary of a Coffee Officer who will be engaged in improving coffee culture and supervising the nurseries.

It was hoped to start the bulk-grading of coffee at Bukoba but hand-mixing was found to be unsatisfactory and attempts are now being made to find a mechanical apparatus which will do this work.

The zoning of cotton marketing in itself functioned satisfactorily but marketing facilities were inadequate for the sale of an unexpectedly big crop in a rather short period. Attention is being paid to this matter in 1949.

There has been much dissension within the Bukoba Agricultural Association which sells the European potato crop. Deprived of the stimulus provided by the drive and enthusiasm of the original promoters of the group, production has deteriorated in quality, and the future of this crop is not very promising.

(R) *Implements.*

There are at least 10,000 ox-ploughs now in use in the Lake Province, of which half are in North Mara. The Sukuma Plough Rules are now law and annual permits costing Sh. 1/- are being issued in order to register the plough owners. Plough Instructors have been recruited from Kuria for work in Sukuma to teach the Wasukuma how to train oxen and how to plough. The plough should enable the cultivator to make much more use of his heavy land and once he has learnt to plough on the contour and take other precautions, realizing he must ridge the land afterwards, he may in due course be allowed to plough the light soils. Attempts are being made to get a type of ridging mould board designed by Mr. J. T. Purvis, Agricultural Officer, manufactured by Messrs. Ransomes, Sims, and Jefferies.

A few enterprising Africans and non-natives have purchased tractors but the soils of the Lake Province are some of the most intractable I have met. The tendency is to under-estimate the power required. Fifty wheelbarrows were purchased by the Department and issued to the District Commissioner, North Mara, who is concentrating them into a small area where they are used to transport manure to the fields. A few are owned communally in Sukuma and we are encouraging some interest in them.

The mechanical units mentioned in the last report are to be ordered under the Cotton and Food Production scheme and equipment has been chosen.

(S) *Crop Surveys.*

The acreage survey of Bugufi will be of value when Administration staff is available to settle the vexed question of land tenure in that chiefdom.

The crop survey of Sukumaland is definitely planned for 1949 on a stratified multi-stage sampling basis. Dividing the area into zones and instead of taking random fields all over the 10,000 square miles, taking from a certain percentage of parishes in each zone and from a certain percentage of taxpayers in each parish all at random.

## Conclusion

As a conclusion to this report I can only refer to and emphasize those I have written for the previous four annual reports which all bear on the fact that our chief aim is "better farming". This we can only achieve through more staff and better African staff. New methods of approach to the peasant must be tried. The impact of the machine on peasant agriculture must be studied.

There is a big field for improvement in the production of crops from the land. So much of the agriculture is grossly inefficient and twice the crops could be produced, or half the acreage used. The average cultivator is not yet alive to this position and will not be until closer contact is made with him. There must be field staff, and village committees and constant contact and continuity to get lasting results.

The absence of specific references to and thanks for co-operative service from other departments is not an indication that co-operation is not readily given.

Co-ordination of effort between departments working with the people is a *sine qua non*, and is generally readily given, expected, and accepted. We all have the same job which is the improvement of the lot of the African.

N. V. Rounce,
*Provincial Agricultural Officer,*
*Lake Province*

# PRODUCE MARKET STATISTICS—LAKE PROVINCE, 1948

*Tons of 2,000lbs Value in £*

| District | Seed Cotton | | Groundnuts | | Simsim | | Chickpea | | Paddy | | Grains | | Gum | | Cowpea | | Beans | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value |
| | | £ | | £ | | £ | | £ | | £ | | £ | | £ | | £ | | £ |
| Kwimba ... ... ... | 6,008 | 140,394 | 259 | 3,878 | 14 | 182 | 907 | 19,554 | 2,040 | 17,948 | – | – | 88 | 1,847 | 114 | 1,022 | – | – |
| Musoma ... ... ... | 1,896 | 41,706 | 491 | 7,138 | 88 | 1,196 | – | – | 473 | 4,943 | 97 | 554 | – | – | 19 | 188 | 7 | 66 |
| North Mara ... ... | – | – | – | – | 28 | 429 | – | – | – | – | 2,389 | 14,334 | – | – | – | – | – | – |
| Maswa ... ... ... | 4,303 | 98,754 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Shinyanga ... ... | 1,870 | 43,818 | 745 | 11,547 | | – | 23 | 480 | 595 | 3,520 | 207 | 1,363 | 150 | 5,071 | 138 | 1,392 | – | – |
| Mwanza ... ... ... | 16,885 | 396,348 | 197 | 2,981 | 9 | 129 | 1,400 | 30,800 | 4,542 | 38,968 | 872 | 5,232 | – | – | 667 | 10,005 | 58 | 522 |
| Bukoba ... ... ... | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | 1,300 | 11,700 |
| Totals ... | 30,962 | 721,020 | 1,692 | 25,544 | 139 | 1,936 | 2,330 | 55,687 | 7,660 | 65,429 | 3,565 | 21,483 | 233 | 6,919 | 938 | 12,607 | 1,365 | 12,288 |

| District | *Coffee (Arabica) | | *Coffee (Robusta) | | *Soya Beans | | Onions | | *Potatoes | | *Citrus | | Cassava | | Sunflower Seed | | Other Legumes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value | Tons | Value |
| | | £ | | £ | | £ | | £ | | £ | | £ | | £ | | £ | | £ |
| Ngara ... ... ... | 50 | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Kwimba ... ... ... | – | – | – | – | – | – | – | – | – | – | – | – | – | – | 33 | 385 | 5 | 44 |
| Musoma ... ... ... | – | – | – | – | – | – | – | – | – | – | – | – | – | – | 84 | 1,083 | – | – |
| North Mara ... ... | – | – | – | – | – | – | – | – | – | – | – | – | – | – | 130 | 1,950 | – | – |
| Maswa ... ... ... | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – | – |
| Shinyanga ... ... | – | – | – | – | – | – | – | – | – | – | – | – | 3 | 12 | 23 | 352 | – | – |
| Mwanza ... ... ... | – | – | – | – | – | – | – | – | – | – | – | – | 157 | 630 | 19 | 284 | 47 | 470 |
| Bukoba ... ... ... | 1,090 | 77,605 | 4,998 | 239,341 | 207 | – | 75 | – | 344 | – | 190 | – | 10 | 40 | – | – | – | – |
| Totals ... | 1,140 | 77,605 | 4,998 | 239,341 | 207 | – | 75 | – | 344 | – | 190 | – | 170 | 682 | 289 | 4,054 | 52 | 514 |

*Long tons of 2,240 lb.

## Weather

Weather conditions were favourable to crop production in most areas of the Province. Rainfall was excessive in the Lake Shore area of Rungwe District, which caused flooding, drought conditions followed, resulting in considerably reduced rice yields. The "Nyahenge" or light rains and mist normal during April and May at the higher altitudes, completely failed this year. This failure was reflected in the dry season tea production. Dry weather conditions, excepting in Mbeya District, persisted to late December when the rains broke. Most plantings for the 1948/49 season were, as a result, planted more than one month later than is usual. Rainfall in inches, from the districts for the last five years was as follows :—

| | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Iringa ... | 37·94 | 35·79 | 21·36 | 34·76 | 26·80 |
| Njombe ... | 57·15 | 45·70 | 38·19 | 43·10 | 45·1 |
| Tukuyu ... | 96·13 | 129·33 | 79·15 | 109·81 | 95·74 |
| Mbeya ... | 37·83 | 39·57 | 37·40 | 37·87 | 37·05 |

Precipitation and distribution in all districts was more or less up to average, excepting in Iringa District where the dry season was unduly prolonged. The rainfall over the planting season was, however, satisfactory as the seasonal figures show :—

| Month | 1944/45 | 1945/46 | 1946/47 | 1947/48 |
|---|---|---|---|---|
| August ... | — | — | — | — |
| September ... | — | — | — | ·02 |
| October ... | 1·73 | — | — | — |
| November ... | 6·76 | ·17 | ·78 | 2·06 |
| December ... | 8·13 | 5·20 | 6·44 | 5·29 |
| January ... | 9·77 | 2·59 | 10·78 | 8·71 |
| February ... | 7·98 | 1·82 | 3·03 | 2·51 |
| March ... | 7·14 | 4·18 | 5·67 | 7·30 |
| April ... | 4·43 | 4·51 | 6·07 | 2·89 |
| May ... | 1·04 | 1·03 | 1·00 | ·98 |
| June ... | ·06 | — | ·86 | ·01 |
| July ... | — | — | — | ·01 |
| | 47·04 | 19·50 | 34·63 | 29·78 |

## Native Crops

*Maize.*—Maize purchased amounted to 8,564 tons, a slight increase on last year's total. Selected seed was again distributed to natives and although quality has not improved noticeably the forty per cent maize of better quality passing through the markets last year has been maintained. There is still room for improvement in the quality of maize grown by Africans and efforts to this end continue, mainly by the distribution of good quality seed.

Maize purchased in tons for the last four years was :—

| 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|
| 3,144 ... | 3,270 ... | 8,002 ... | 8,564 |

*Rice.*—Paddy purchased amounted to 2,475 tons. The Rungwe Lake Shore crop was over 1,000 tons less this year, due to adverse weather conditions and the markets being two months late in opening. It is estimated that 1,000 tons of paddy annually have been lost to the Territory in recent years due to the inability of the Railways to clear the crop in time. Markets were not opened until the 1947 crop was cleared resulting in the two months delay in opening the markets. Usangu area produced some 215 tons of paddy, an

unexpected expansion in rice cultivation. This expansion by Africans in the area has resulted from the example of Baluchi growers in Usangu who are keen rice cultivators. The Idodi, Pawaga and Usagara areas of Iringa District only produced their own requirements, three tons were marketed. Rice purchased in tons for the past four years was :—

| 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|
| 1,154 | 2,821 | 3,382 | 2,475 |

*Beans* and *Peas* are in great demand in the Province and production is barely sufficient to meet local requirements. Beans and peas do well in suitable areas and production is being encouraged. Crops purchased in tons for the last four years were :—

| 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|
| 298 | 245 | 625 | 709 |

*Eleusine.*—An excellent year for eleusine, production being more than double the 1947 crop. Crops purchased in tons for the last three years were :—

| 1946 | 1947 | 1948 |
|---|---|---|
| 153 | 209 | 460 |

The cultivation of eleusine by the cutting and burning of trees has been forbidden in the Province. Propaganda and prosecutions have had effect and a definite decrease in the area of forest destroyed is to be observed this year.

*Wheat.*—Wheat growing by Africans is on the increase in the Iringa and Mbeya Districts, wheat now being popular as a food. No doubt surpluses would be marketed if prices were suitable but the price obtainable at mill, which is at Iringa, offers no inducement to the natives to sell. Preliminary negotiations have commenced with MFessrs. Unga Ltd., to install a mill at Mbeya and the project is being considered by the Company.

*Sweet Potatoes and Cassava.*—Rungwe District, the main area for the cultivation of sweet potatoes, had an average year. Cassava is being introduced to areas of marginal rainfall such as Ukimbu Chiefdom of Mbeya District where the Agricultural Officer reports "every cultivator has his cassava plot". Africans in the marginal rainfall areas are, however, not keen to plant cassava, as for example, in the Pawaga area of Iringa District where many introductions have been made and only very few plots are to be seen to-day. Efforts continue to try and make the crop popular in these areas.

*Onions* are grown by Africans for local consumption only. Bombay Red seed is planted.

*Sunflowers* are now grown throughout the Province excepting in Rungwe District where they are being introduced in 1949 in the drier areas. Mbeya and Chunya Districts produced 166 tons in the first year of cultivation. The crop is popular and it is thought will continue to be so, despite the decrease in price.

*Vegetables.*—The cultivation of vegetables is on the increase. The Polish Camp in Njombe District is supplied by Africans, other growers sell to Europeans contracted to the Overseas Food Corporation. Consumption of fresh European vegetables by Africans is now general.

*Beeswax.*—About twelve tons were collected and exported from the Chunya and Mbeya Districts.

*Jaggery.*—A few Africans in the Usangu area of Mbeya District grow sugar cane which they sell to two small mills operating in the area. Production this year amounted to eighteen tons.

*European Potatoes.*—Good crops were harvested with little evidence of blight. Production exceeds local demand, the high cost of transport limits exports. Potatoes grown in the Iringa District supply the Overseas Food Corporation and in Mbeya District the Dar es Salaam market. Some areas such as Dabaga in the Iringa District have gone out of production completely, due to blight.

*Coffee.*—A record crop was obtained in Rungwe District, the Moshi area of Mbeya District maintaining production at last year's level. Production figures in tons were as follows :—

| | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|
| Rungwe ... ... | 194 | 147 | 194 | 370 |
| Mbosi ... ... | 54 | 9½ | 32½ | 32 |

The crop was purchased by the growers' Co-operative Society and the same price paid as last year—Grade I one shilling, Grade II fifty cents and Grade III twenty cents. A bonus from the Society to the growers will be likely as the crop was sold to South Africa at an average price of £150 per ton. Upkeep of the coffee plots was generally satisfactory but abandoned plots again gave trouble, absent owners being difficult to deal with.

## Food Supplies

With the excellent harvests obtained throughout the Province the Africans had ample supplies of food and large surpluses for sale. Fed labour requirements were met and adequate reserves of food stored. Exceptions to this generalization were met with in isolated areas such as Pawaga in the Iringa District and parts of Usangu in Mbeya District. Shortages in these areas recur annually but no hardship is suffered by the Africans in that food can be purchased, most of the people being rich cattle owners who do not and will not cultivate.

## Markets and Marketing

The marketing system in the Province operated smoothly throughout the year. Mbeya maize markets were purposely delayed in opening to allow of the proper drying of the maize crop. On the whole, however, the crops were marketed satisfactorily. Controlled crops were purchased by Messrs. Unga Ltd., in the Iringa and Njombe Districts and in Mbeya by the Mbeya Produce Group. The undernoted produce in tons was purchased in the markets or by purchasing agents during the year :—

| | 1946 | 1947 | 1948 |
|---|---|---|---|
| Maize ... ... | 3,270 | 8,002 | 8,564 |
| Paddy ... ... | 2,821 | 3,367 | 2,475 |
| European Potatoes | 244 | 618 | 959 |
| Beans and Peas ... | 244 | 625 | 709 |
| Wheat ... ... | 98 | 50 | 98 |
| Coffee ... ... | 156 | 610 | 596 |
| Sunflower ... | — | 315 | 1,300 |
| Vegetables ... | — | 260 | 966 |

The above produce was obtained by districts as follows :—

| | Iringa | Mbeya | Njombe | Rungwe |
|---|---|---|---|---|
| Maize ... ... | 4,359 | 3,200 | 208 | 797 |
| Paddy ... ... | 3 | 215 | — | 2,257 |
| European Potatoes | 91 | 825 | — | 43 |
| Beans and Peas | 136 | 261 | 174 | 138 |
| Wheat ... ... | 68 | 30 | — | — |
| Coffee ... ... | — | 226 | — | 370 |
| Sunflower ... ... | 931 | 166 | 194 | 9 |
| Vegetables ... | 336 | 120 | 300 | 210 |

Now that the market sites have been definitely established in the most suitable places for the purchasing of produce, permanent buildings will be erected.

## Non-Native Crops

*Pyrethrum.*—Production this year amounted to only 335,954 lb. as against 679,949 lb. in 1947. Nine estates were out of production from June to December under the Government Compensation Scheme to reduce production. Planters, accepting the compensation, instead of keeping up their estates with the compensation paid, allowed their fields to revert to grass. With a market for pyrethrum again, the Southern Highlands were given a quota of 250 tons, the planters were unable to meet the demand, replanting being necessary. A loan was sought from Government to assist in the reclearing and replanting of the abandoned fields. This was refused and application to the Land Bank for assistance has now been made. Production in lb. from the producing areas was as follows :—

| Month | Dabaga | Njombe | Sao Hill | Mbeya | Uwemba |
|---|---|---|---|---|---|
| January | 150 | — | — | — | — |
| February | 14,112 | — | 2,217 | — | 7,437 |
| March | 5,480 | — | 5,476 | — | 8,790 |
| April | 31,499 | 1,821 | 1,621 | 4,358 | 38,842 |
| May | 8,619 | — | — | 19,428 | 33,346 |
| June | 1,052 | 2,243 | 304 | — | 1,255 |
| July | 2,596 | — | 80 | — | 7,239 |
| August | 5,027 | 83 | — | — | 2,119 |
| September | 4,826 | — | — | 3,520 | 5,174 |
| October | 11,198 | 856 | 55 | 5,416 | 6,122 |
| November | 15,603 | 510 | 224 | 7,231 | 49,752 |
| December | 3,714 | 549 | — | 6,991 | 9,019 |
| | 103,876 | 6,062 | 9,977 | 46,944 | 169,095 |

| | |
|---|---|
| Total | 335,954 |
| Rejected | 334 |
| | 335,620 |

### Production by Grades

| | |
|---|---|
| Grade I | 247,738 |
| Grade II | 86,635 |
| Grade III | 1,247 |
| Rejected | 334 |
| Total | 335,954 |

Two pyrethrum planters, invented a process for separating the achenes from pyrethrum flowers and named the product "Florax". The product and process created considerable interest in pyrethrum circles. The Tanganyika Pyrethrum Board have acquired, by agreement, the sole right to exploit the invention and its products in East Africa. A contract has been made with a firm in America for the production of the pilot plant. Florax is being purchased on analysis at prices equivalent to the ruling pyrethrum flower price which is £158 per ton to-day at 1·3 per cent. Florax therefore has a future with its undernoted advantages over flowers :—

(1) The higher pyrethrum content.

(2) Better packing with less deterioration of content.

(3) Cheaper transport.

Difficulties were anticipated in the extraction in America but it is understood the existing plant for pyrethrum flowers deals equally well with Florax. The results of a six months contract are awaited with interest.

*Tobacco.*—Production amounted to 1,901,383 lb. Production for the past four years was :—

| | |
|---|---|
| 1945 | 1,537,903 |
| 1946 | 1,029,164 |
| 1947 | 749,389 |
| 1948 | 1,901,383 |

The variety "Ehlers" introduced last year was practically solely grown this year and produced excellent results. This variety, a heavy yielding type, is evidently suitable to the poor soil types and altitude of Iringa District. It yields 500 to 1,000 lb. (according to soil), to the acre and produces bright leaves when cured. It carries the characteristic tang of Iringa tobacco which is not favoured on the English market, but seems to be acceptable to a limited extent locally. With increasing production and the type of tobacco grown, marketing may be a problem in the future. Buyers' reports nearly all mention the oriental tang and that the tobacco is thin and lacking in body. Some improvement may result from the use of fertilisers when these become available but other varieties or markets must be found if the industry continues to expand as in recent years. Great hopes are placed in the Mloa area which was opened to tobacco cultivation this year. It is confidently expected that better flue-cured types can be grown and probably the tang eliminated. The cultivation and upkeep of tobacco was well done but many planters lost considerable poundage of tobacco by failing to provide sufficient barns to cure their crop. The uprooting order was, unfortunately, only carried out in a very haphazard manner by many and it was impossible to proceed with the prosecution of offenders owing to the fact that the staff carrying out the inspection under the order were not qualified inspectors as required by the ordinance.

### Grading Sheds

By a ruling of the Non-Native Tobacco Board grading was carried out on the farms by the farmers this year. The arrangement was not very satisfactory due to the fact that the Board's decision was made late in the season which did not allow growers sufficient time to provide adequate buildings to handle their crops. Only check grading was done at the shed until late in the season, when the Board relaxed their decision and graded tobacco for growers who had failed or were unable to handle their production. Tobacco graded for these growers amounted to 136,198 lb. 784,294 lb. were handled and processed in the sheds this season, 1,117,089 lb. were graded on the farms. The total crop for the season in grades was as follows :—

| Grades | At Farms | % | At Shed | | % | % | Total | % |
|---|---|---|---|---|---|---|---|---|
| 1 ... ... | 34,369 | 3·18 | 8,531 | — | 1·09 | — | 42,900 | 2·24 |
| 2 ... ... | 69,359 | 6·42 | 26,680 | — | 3·40 | — | 96,039 | 5·14 |
| 3 ... ... | 194,261 | 17·92 | 72,107 | — | 9·17 | — | 266,368 | 14·30 |
| 4 ... ... | 53,139 | 4·90 | 27,146 | — | 3·46 | — | 80,285 | 4·30 |
| 5A ... ... | 300,967 | 27·76 | 182,264 | 331,412 | 23·21 | 42·29 | 632,379 | 33·86 |
| 5B ... ... | — | — | 149,148 | — | 19·08 | — | — | — |
| 6A ... ... | 188,943 | 17·43 | 73,874 | 134,905 | 9·42 | 17·19 | 323,848 | 17·34 |
| 6B ... ... | — | — | 61,031 | — | 7·77 | — | — | — |
| 7A ... ... | 86,746 | 7·99 | 36,533 | 81,828 | 4·66 | 10·44 | 168,574 | 9·02 |
| 7B ... ... | — | — | 45,295 | — | 5·78 | — | — | — |
| 8A ... ... | 58,253 | 5·37 | 12,305 | 29,279 | 1·57 | 3·73 | 87,532 | 4·68 |
| 8B ... ... | — | — | 16,974 | — | 2·16 | — | — | — |
| 10B ... ... | 16,948 | 1·56 | 7,517 | — | 0·96 | — | 24,465 | 1·32 |
| 10D ... ... | 47,283 | 4·36 | 47,385 | — | 6·04 | — | 94,668 | 5·06 |
| Scrap ... | 30,743 | 2·83 | 17,504 | — | 2·23 | — | 48,247 | 2·58 |
| Rejects ... | 3,006 | 0·28 | — | — | — | — | 3,006 | 0·16 |
| Total ... | 1,084,014 | 100 | 784,294 | — | 100 | — | 1,868,308 | 100 |

Prices obtained for the various grades were as follows :—

| Grades | At Farms Rate per lb. Shs. Cts | At shed Rate per lb. Shs. Cts. |
|---|---|---|
| 1 | 2 75 | 2 70 |
| 2 | 2 46 | 2 50 |
| 3 | 1 86 | 2 10 |
| 4 | 2 16 | 2 00 |
| 5A 5B | 1 44 | 1 75 |
| 6A 6B | 1 10 | — |
| 6A | — | 92 |
| 6B | — | 83 |
| 7A 7B | 75 | — |
| 7A | — | 67 |
| 7B | — | 58 |
| 8A 8B | 70 | — |
| 8A | — | 60 |
| 8B | — | 50 |
| 10B | 90 | 80 |
| 10D | 85 | 45 |
| Scrap | 50 | 65 |
| Rejects | 50 | — |

The average price was Sh. 1/40 per lb. which makes the total value of the crop approximately Shs. 2,661,936/-.

## General

Improvements were made to the Grading Shed by the addition of a new reception shed, and processing and baling shed. With these new buildings, however, space is still inadequate to deal with the crop hence the necessity for farmers grading their own production. A great improvement in the tobacco leaving the sheds was made by Mr. Sang, the United Africa Company tobacco expert who introduced blending. In an area such as Iringa where tobacco is grown at different altitudes and on varying types of soil the leaf varies greatly in colour in any one grade. This has been the cause of much dissatisfaction to buyers in the past, they rightly maintaining that in many cases the bales did not come up to sample as tobacco from different areas were baled separately. This cause of complaint is now overcome as the blended tobacco gives uniformity in any one grade. Management of the sheds was satisfactory, there being no complaints by the growers. The Board functioned smoothly and did much to create a feeling of co-operation amongst the growers for their mutual benefit and the future of the industry. The growers resolved to ask Government to introduce one channel marketing through a company which is in process of being formed at the time of writing this report. This is considered an essential step in the building up of the industry if markets have to be obtained for the increased and increasing production of tobacco in the district.

## Nicotiana Rustica

In view of the demand for high nicotine content tobacco, planters in suitable areas were approached by a company to grow nicotine this year. Some fifty acres have been planted. A guaranteed price of 7½ per lb. was offered irrespective of the nicotine content, with an additional 1d. per one per cent increase in content over six per cent. The opportunity to prove any area suitable to the crop was a good one but was not taken up with any enthusiasm by planters, the planters considering the 1d. per cent increase too small and that better prices could be obtained on other markets.

*Coffee.*—Production amounted to 194 tons. Production for the last five years in tons was as follows :—

| | |
|---|---|
| 1944 ... ... ... ... ... | 115 |
| 1945 ... ... ... ... ... | 305 |
| 1946 ... ... ... ... ... | 60 |
| 1947 ... ... ... ... ... | 383 |
| 1948 ... ... ... ... ... | 194 |

Coffee in Mbosi area as in most coffee areas in the Territory is biennial bearing. Some estates obtained the best crop for some years. Of the above production 122 tons were produced from the Custodian of Enemy Property estates. Eleven farms totalling some 8,000 acres managed by the Custodian of Enemy Property were handed to the Native Authority as being uneconomic units for European settlement. These were in exchange for the land taken to extend certain ex-enemy farms to make them economic units. The displaced Africans from these extensions are to be settled on the ex-Custodian of Enemy Property farms. Pending investigations and the production of a scheme to settle the Africans, a manager has been appointed to manage the coffee.

*Tea.*—The total production of tea in the Province showed an increase of some 139,869 lb. Production in Rungwe increased by 113,869 lb. and in Mufindi by 26,000 lb. Weather conditions in Rungwe were more or less ideal, the rainfall being well distributed. Mufindi, however, in certain areas again suffered from insufficient rainfall, the "Nyahenge" or heavy mists and rain during the months of April and May having failed completely. Rainfall figures in the tea areas were as follows :—

| | | Inches |
|---|---|---|
| Mufindi: | Mufindi West ... ... ... ... | 73·79 |
| | Lugoda ... ... ... ... | 33·42 |
| | Mufindi East ... ... ... ... | 42·63 |
| | Rungwe : Musekera ... ... ... | 91·51 |
| | Chivanje ... ... ... ... ... | 81·74 |

The precipitation at Lugoda and Mufindi East, both areas on the edge of the forest, again emphasizes the urgency of re-afforestation. Areas felled increase annually. Some 400 foreign Africans were compensated by Government last year and removed from the forest area. Apparently, many have returned and no doubt brought their friends with them as, from observation, more Africans are settled in the area than previously. With the increased population land has to be cultivated more frequently and it is now noticeable that cultivated areas are not now regenerating forest but reverting to grass. Parts of Mufindi, at best marginal for tea, are now uneconomic, fifty inches being considered the minimum precipitation for economic tea production. New methods of cultivation are necessary and are now being practised by mulching and the planting of shade trees. The upkeep of the tea estates was all that could be desired, infilling was carried out on all estates and seventy-two acres were planted to tea on the Custodian of Enemy Property estates. This completes the new clearings undertaken by the Tanganyika Tea Co. on the Custodian's behalf. The ban on imported seed caused concern amongst the companies and individual planters, and local seed has now to be used. There were no labour difficulties in the industry, the supply being adequate for the work to be done. Tea production in lb. for the last four years was as follows :—

| | |
|---|---|
| 1945 ... ... ... ... | 879,714 |
| 1946 ... ... ... ... | 1,141,727 |
| 1947 ... ... ... ... | 1,028,280 |
| 1948 ... ... ... ... | 1,168,149 |

*Maize.*—6,267 acres were planted to maize by Europeans producing 2,055 tons or an average of 3¼ bags to the acre. Production for the last three years was as follows :—

| | 1946 | 1947 | 1948 |
|---|---|---|---|
| Acres ... ... | 7,030 | 6,659 | 6,267 |
| Yield in tons ... | 2,459 | 2,881 | 2,055 |
| Bags per acre ... | 3½ | 4½ | 3½ |

As in past years tobacco planters were required to plant areas to maize equivalent to those planted to tobacco. The Province is definitely a borderline maize production area and it is very doubtful if Europeans would continue to grow maize if the Acreage Grant was discontinued.

*Wheat.*—266 acres were planted to wheat in Iringa District producing fifty-seven tons or 2·2 bags to the acre. Production for the last three years was :—

| | 1946 | 1947 | 1948 |
|---|---|---|---|
| Acres ... ... | 590 | 337 | 266 |
| Yield in bags ... | 944 | 674 | 578 |
| Bags per acre ... | 1·6 | 2 | 2·2 |

Mbeya production amounted to twenty-six tons. A type of wheat for the production of flour suitable for bread making has yet to be found for this Province, two main characteristics are required, namely strength and distensibility. By arrangement with Messrs. Unga Ltd. observation trial plots of various wheats will be laid down in 1949 at Iringa and Mbeya with a view to finding wheats exhibiting these two special characteristics.

*Vegetables.*—Vegetables have been cultivated extensively. The vegetables are purchased by the Overseas Food Corporation for Kongwa and Lindi and transported by air. Most planters to-day are suppliers of varying quantities and the project has been a very profitable extra to the planters concerned. As much as 336 tons were exported from Iringa District alone.

*Sunflowers.*—Large areas were planted to the crop. Good yields were obtained. No separate figures of European production are available. With the drop in price the crop will lose favour with planters and it is expected that only small areas will be planted in 1949.

*Potatoes.*—Some ninety tons were produced in Iringa District for export and 314 tons in Mbeya District. An introduction of Blight resistant potatoes, variety 911a (91) from Scotland was made, but unfortunately, they became infected with Leaf Roll, from which the Province is free. The potatoes were therefore not distributed, but despatched to Morogoro where Leaf Roll already exists. A consignment of Blight resistant and possibly Leaf Roll resistant potatoes, variety 833(9)98 is now awaited.

## Pests and Diseases

Generally crops were fairly free from pests and diseases this year, there being no serious damage to crops. Pests and diseases observed on crops are listed below :—

### *Coffee*

*White Borer* was present in coffee in all estates but mostly under control, gangs being steadily employed in destruction and collection.

*Thrips* made their appearance in isolated areas towards the end of the dry season but caused no serious damage.

*Hemileia* was present on most estates. Africans do not spray against Hemileia and their coffee suffers heavy defoliation annually.

*Dieback* was observed in isolated patches in Mbosi coffee. It is thought that soil conditions may be the cause, deficiency of one of the trace elements being suspected.

*Armillaria* was present in tea, particularly in Rungwe, but infection is not serious, deaths caused by the disease can be described as normal and to be expected in tea. The following were also observed on tea but caused no serious damage excepting the gummiferous fungus which caused defoliation of considerable areas of tea at Mufindi. *Bagworm*, *Phyllosticta theæ*, *Restalotia theæ Colletotrichum camelliæ and Elsinœ theæ*. Tea yellows was observed in Rungwe where gardens had not been treated.

*Pyrethrum* was remarkably free from pests and diseases. *Thrips*, at the end of the dry season were the only pest noted.

*Tobacco*

*Eelworm* was found in all tobacco lands and has been observed on tobacco in the newly opened land at Mloa.

*Cutworm* damaged seedlings in the nurseries and in the field.

*Whitefly* was little in evidence this year.

*Leaf Curl* was noted in Iringa District on "Ehlers" but attacked W.S.O. heavily at Chimala.

*Mosaic* was little to be seen up to harvesting time when the disease spread throughout most fields.

*Snails* caused some damage to seedlings in nurseries.

*White Rust* was little seen, Ehlers being practically free whereas W.S.O was infected.

*Kromnek* was observed for the first time in 1947, this disease was found in all areas planted to tobacco this year. The disease in Iringa is, it is understood, not such a virulent type as that in Rhodesia. Drs. Hopkins and Wallace made a special study of the disease during the year and recommendations were made and implemented for its control.

*Rosette* was suspected on two farms but not confirmed.

*Angular Leaf Spot* was present on most tobacco.

*Earth fleas* damaged seed beds.

*Sunflower*

*Sclerotinia* was to be found in most areas where sunflowers were grown. Europeans and Africans were instructed in control measures and propaganda carried on for the control of the disease.

*Maize*

*Stalk Borer* and *Cutworm* took their usual toll of the crop, but damage was no worse than in other years. Propaganda for the control of stalk borers continues annually.

*Potatoes*

Blight was in evidence in all areas where potatoes are grown but damage was less than in previous years.

*Wheat and Beans*

*Yellow* and other rusts (unidentified) were observed on wheat and beans. These rusts apparently do not affect production.

## Soil Conservation

Progress continued to be made in the control of erosion in the Province. The cultivated areas of Rungwe District can now be considered controlled. The Africans, after fifteen years of demonstration and propaganda, are erosion minded and control measures in cultivation have become automatic. Erosion caused by overstocking with cattle is now being tackled and with good result to date. The Agricultural Officer, Mbeya, reports that 804 cases were dealt with by the Native Courts for contravention of the Soil, Water and Forest Conservation Rules. Of these cases, 684 were for failure to contour bank, 92 for tree cutting and 28 for burning offences. One of the main difficulties in the system of control followed in the Province is that the contour banks required in all cultivation are, in some areas, as the Mporotos of Mbeya District, not left permanently but are broken down after harvest as a control against rats and couch grass. Other methods of control are being studied for such areas.

The felling and burning of trees for the cultivation of eleusine (finger millet) continues to be the main problem of conservation in the Province. The steps taken to date, i.e. the forbidding of the cutting of trees for eleusine cultivation, although of value, is not the answer to the problem. It cannot be expected, to break down a traditional custom in a few years time. Demonstration plots of eleusine planted without the cutting and burning of trees for the purpose, will be instituted in all chiefdoms this year when Africans by observation of the results and the propaganda being carried on, can be educated to cease their present destructive practice. Extensive bush fires were general towards the end of the dry season and it would be difficult to say whether the areas burnt were less extensive than in previous years. However, propaganda is being continued aiming at early burning with the fixing of a final date for each district. In time, these destructive fires should be controlled. European farmers are now alive to the erosion danger and most farmers have taken steps to control erosion on their farms.

## Experimental Work

Reports from the districts on experimental work are as follows :—

"*Mbosi Coffee Sub-station.*—The coffee variety trial (six varieties—E59, F839, N69, F280, F689 and P35, in four latin squares) was replanted during January and February, and the guard rows supplied as necessary, a line of seedlings of *C. myrtifolia* were also planted on the north side of the plot. Further seed of the above six varieties was received and sown in the nursery during February, also seed of the following clonal selections—N39, N197, N29, N5, N218, KP683, KP532, KP154, KP263, KP228, KP423 and H66. Seed of another twenty-four coffee selections (AB11, AB35, AB92, I5, I49, I60, I235, N128, N20, N30, N48, N76, N81, N110, N198, N205, N220, R2, R3, R11, R15, R23, M7, M97) were sown on 21st August, 1948. Three pickings of coffee were made from the guard rows and thirty-one debes of cherry were obtained: nine debes were distributed to local planters for planting and the remaining twenty-two debes were sent to Mr. Allan for pulping and drying. The nursery was maintained and extended towards the end of the year to allow for increased planting of coffee seed selections and shade tree seeds. The young coffee plants in the variety trial were watered and cared for throughout the dry season, in spite of which some forty-nine plants succumbed but all the coffee varieties in the variety trial had been supplied again, including

weak plants, by the end of the year. During December all coffee received a dressing of Bat Guano (small coffee one cigarette tin per tree, mature coffee four cigarette tins per tree). Shallow pits have been prepared in the nursery to enable composting to be done during the rainy season. The variety trial was mulched during May/June and the alternate trenched rows were filled in : a second mulching was done during November, and in December the alternate rows were again trenched. An area of about one acre near the rest house has been holed out for planting *Eucalyptus maideni* seedlings.

Following a visit to the Sub-station by the Senior Research Officer, Lyamungu, during July, steps were immediately taken to enlarge the total area of the Sub-station from approximately 13 acres to 112 acres. Formal application has been made through the District Commissioner, Mbeya. The boundaries of the extensions have been demarcated and planted with a double staggered line of Cypress trees. One African, employed as a headman on the Sub-station, was compensated to the amount of Shs. 120/- for huts and crops on the extension area. Some nine acres of the extension area opposite the original plot have been stumped and cleared, and one ploughing done, in preparation for the siting of four more Latin Squares. The area is being prepared for sowing a crop of wheat in early March to test soil variability. Cypress and Grevillea windbreaks are also being planted on the south and east side of this area.

Seedlings of *Aleurites montana* were planted along north and west side of the coffee variety trial during March, and in most cases are growing well. Two small plots of *Lespedeza* (*Korean* and *Kobe*) were sown in January and harvested in June; both varieties grew well and a useful harvest was obtained. A plot of tropical kudzu vine was also sown in January, and shows fair promise after a very slow start. Seed of *Queensland Nut* was sown during June and again in December; germination of the earlier sowing has commenced. At the end of the year preparations were well advanced for the sowing of one acre of Niger oil seed, and small plots of the two varieties of Lespedeza. Last season's trial plots of Lespedeza have produced a heavy germination (from fallen seed) after the first rains, and it has been decided to retain these plots for further observation and multiplication of seed.

*Linseed* trials were carried out in the Mporotos and Njombe District, with seed of the Punjab variety obtained from America. Very encouraging yields were obtained varying from 270 kgs. to 604 kgs. per acre in the Mbeya District and 108 kgs. to 239 kgs. in the Njombe District. These trials will be continued in 1949, including the Rio and Royal varieties, seed of which has been obtained from America and Canada respectively. *Flax* trials were conducted only in the Njombe District this year; good results were obtained, but it has been decided not to continue with this crop, for the present at any rate, in view of other more profitable crops, including linseed, which Africans can be encouraged to grow."

### Iringa

*Sunflower Trials.*—Two small ¼-acre plots were planted in December for the new season. ¼-acre ridged and ¼-acre on the flat.

*Tobacco Varieties Trial.*—Ten varieties of tobacco seed were planted at Mloa on Mr. Mitsingas farm, each variety will be planted out into three different areas on the farm. Thirty plots of 10 × 10 yards were marked out, transplanting will be done early in January, 1949.

*Oil Palms.*—The 1,000 Deli and 1,350 Kangalla Palm Oil seeds planted on the Lake Shore area of Rungwe District germinated well. The nurseries were unfortunately repeatedly attacked by porcupines which ate the seedlings during the night, only some 118 plants now surviving in the nurseries. These few remaining plants will be distributed to Africans for planting with the rains.

### Seed Distribution

The Department assisted the pyrethrum planters of Uwemba District to obtain Lavender splits from Kenya. These arrived safely and are making good progress. The Pea seed received from England was planted this season. The crop was only fair but samples sent for examination were favourably reported on and two tons have now been despatched.

The grant in aid to the Pig industry of £2,000 made in 1947 has served its purpose in reviving industry in that, to-day, the delivery of 200 pigs weekly to the factory is in sight. Ten Gilts and six Pedigree Boars were imported to the district this year. There are probably twelve European breeders, six of whom are in production, and many African pig keepers to-day. Unfortunately, having reached this stage of production the machinery in the factory is worn out and beyond repair and a new factory is essential. Steps are being taken to obtain this factory which may be sited at Iringa.

The Agricultural Officer, Iringa, served as Executive Officer up to his proceeding on vacation leave, when Mr. R. O. White replaced him. The Committee held eight meetings during the year. Loans granted by the Committee were as follows :—

| | | | | | |
|---|---|---|---|---|---|
| Crop Loans to ten farmers | ... | ... | ... | ... | Shs. 73,400/- |
| Machinery Loans to sixteen farmers | ... | ... | ... | ,, | 179,700/- |

Repayment of loans and interest has been made in full excepting a few cases, but it is expected that these will be repaid in due course. Maize Planting Grants were paid to fifty-five farmers and amounted to Shs. 154,240/-.

### General

The Province again enjoyed a prosperous agricultural year. Crop yields were excellent and prices satisfactory. Food supplies were adequate for all and fed labour requirements met. In addition, some 4,500 tons approximately of maize were exported. The tea industry increased production; the increase, however, could have been greater, rainfall being the limiting factor. The Pyrethrum industry is reviving, reclearing and replanting of pyrethrum being undertaken. Alternative crops are also under trial in Uwemba, the main pyrethrum producing area, these are essential oils—Geranium, Lavender, Peppermint and Linseed is also being planted.
pyrethrum producing area, these are essential oils—Geranium, Lavender, Peppermint and Linseed is also being planted.

### Acknowledgments

I should like to extend my thanks to the Agricultural staff stationed in the Province for their hard work and co-operation with me, and the officers of the Administration for their assistance to the officers of this Department.

F. W. Thomas,
*Provincial Agricultural Officer,*
*Southern Highlands Province*

## Weather Conditions

*Moshi.*—The 1947 short rains and 1948 long rains were little more than half the average but distribution was so good that, in the main cultivation regions, very good crops were reaped. Eastern Kilimanjaro (which depends largely on the short rains) and the marginal lowland areas received insufficient rain and partial or total crop failures were common.

*Arusha.*—The 1947 short rains began rather late but precipitation and distribution were, on the whole, conducive to satisfactory crop yields. The long rains did not commence in earnest till mid-April and precipitation was negligible after May; crop yields were in consequence below average but quality was good, particularly in the case of seed beans and wheat. The western and lowlands areas got very little rain during the year. The 1948 short rains were also late and it was not till December that appreciable rainfall occurred.

*Mbulu.*—The 1947/48 season opened well in December but thereafter the rainfall was light and patchy and only below the Rift Wall and in the higher portions of southern Iraqw were reasonably good crops reaped.

The following table shows the seasonal and annual rainfall at the three district headquarter stations, averages for previous years being shown in brackets :—

*Rainfall in inches—October, 1947, to December, 1948*

| | Moshi | (37 Yrs.) | Arusha | (25 Yrs.) | Mbulu | (28 Yrs.) |
|---|---|---|---|---|---|---|
| October 1947 ... ... ... | 0·06 | (1·12) | 1·43 | (1·43) | 0·19 | (0·75) |
| November 1947 ... ... | 1·42 | (2·48) | 2·58 | (4·57) | 0·77 | (3·27) |
| December 1947 ... ... | 0·97 | (2·12) | 3·98 | (3·57) | 7·52 | (4·45) |
| January 1948 ... ... ... | Nil | (1·35) | 2·92 | (2·26) | 4·33 | (4·00) |
| February 1948 ... ... | 0·08 | (1·97) | 1·48 | (3·50) | 0·90 | (3·33) |
| March 1948 ... ... ... | 4·41 | (4·54) | 3·07 | (7·36) | 3·52 | (5·94) |
| April 1948 ... ... ... | 7·73 | (13·80) | 19·75 | (13·58) | 5·56 | (6·41) |
| May 1948 ... ... ... | 6·05 | (9·13) | 4·60 | (8·15) | 1·74 | (2·49) |
| June 1948 ... ... ... | 0·80 | (1·49) | 1·94 | (1·33) | 0·13 | (0·18) |
| July 1948 ... ... ... | 0·33 | (0·99) | 0·61 | (0·48) | 0·07 | (0·03) |
| August 1948 ... ... ... | 0·37 | (0·72) | 0·28 | (0·87) | Nil | (0·08) |
| September 1948 ... ... | 0·02 | (0·73) | 0·05 | (0·90) | Nil | (0·20) |
| Total for Season ... ... | 22·24 | (40·44) | 42·69 | (48·00) | 24·73 | (31·13) |
| October 1948 ... ... | 0·98 | (1·12) | 1·05 | (1·43) | 2·39 | (0·75) |
| November 1948 ... ... | 0·16 | (2·48) | 1·98 | (4·57) | 1·01 | (3·27) |
| December 1948 ... ... | 4·99 | (2·12) | 17·70 | (3·57) | 3·64 | (4·45) |
| Total for 1948 ... ... | 25·92 | (40·44) | 55·43 | (48·00) | 23·29 | (31·13) |

## Crop Production and Food Supplies

Crop yields in general were slightly below average but increases in acreage more than made up the deficiency and surpluses in some cases, particularly maize, created new records. Cotton and pyrethrum fell away rather heavily in production, the causes being, to a large extent, economic. The only areas which experienced food shortages were North Iraqw and the dry western areas of Mbulu and eastern Kilimanjaro but in all these cases there were sufficient supplies close at hand to obviate any real hardships. The position in Mbulu has been alleviated by valley bottom plantings and in western Kilimanjaro

by good short rains in the 1948/49 season. Taken by and large 1948 can be summed up as a very satisfactory crop year.

### MAIZE

The 1947 record of 124,000 bags of surplus maize for the Province has been beaten by 69,000 bags—a very creditable achievement considering the paucity of the rainfall in 1948. The greater part of the increase is accounted for by increased African acreages in both the Moshi and Arusha districts as the table below shows.

The Arusha African short rains crop of 1947/48 was very successful and resulted in nearly 10,000 bags being delivered to the control. The main crop was planted rather late which, coupled with rather poor rains, resulted in depressed yields. In Moshi, African maize growing received an additional fillip by the acquisition of certain former European-owned farms, including short leases from the Custodian of Enemy Property, the fullest use being made of such land. Although rainfall distribution was conducive to good yields in the main maize belt the crop was a failure in the marginal rainfall areas below the Moshi-Himo road.

The difficulties confronting non-native maize growing were eased considerably by the release of wheat scheme machinery although there was, and still is, a shortage of ploughs. The total acreage was just about the same as 1947 and the rise in output was due mainly to favourable rainfall distribution in the Moshi maize belt. There was an early outbreak of Army Worm on some farms but the effect was not marked as replanting was possible before the season became too advanced.

The crop was marketed through the Control's agents, the Kenya Farmers' Association, the price being Shs. 19/- per 200 lb. bag (inclusive of bag) plus a bonus of Shs. 3/50 per bag for lots of thirty bags and over.

*1948 Maize Surplus (Bags) delivered showing Percentage Increase or Decrease compared with 1947*

| District | Native | Non-Native | Total |
|---|---|---|---|
| Moshi ... ... ... | 84,741 (+169%) | ... 58,983 (+20%) | ... 143,724 (+78%) |
| Arusha ... ... ... | 23,410 (+ 63%) | ... 26,432 (−11%) | ... 49,842 (+13%) |
| | 108,151 (−136%) | ... 85,415 (+ 9%) | ... 193,566 (+56%) |

*Maize Deliveries to Control (Bags), 1945 to 1948*

| | | | |
|---|---|---|---|
| 1945 ... | 25,818 ... | 76,183 ... | 102,001 |
| 1946 ... | 6,056 ... | 31,251 ... | 37,307 |
| 1947 ... | 46,882 ... | 78,572 ... | 124,454 |
| 1948 ... | 108,151 ... | 85,415 ... | 193,566 |

### WHEAT

Despite adverse weather conditions which in a few places caused complete failures (e.g. the lower areas of Ol Joro, Arusha), wheat production showed a satisfactory increase, mainly due to extended European plantings in the Ngare Nairobi area. The quality of the grain was higher than usual and disease in the crop was of negligible proportions.

The non-native crop was sold through the Northern Province Farmers' Co-operative Society, acting as sub-agents to the Kenya Farmers' Association, and the native crop was sold to the latter with the assistance of a local farmer. The price of first quality wheat was raised from Shs. 27/50 (1947) to Shs. 34/- per bag of 200 lb., inclusive of the cost of the bag.

The following are the statistics of production over the past six years, exclusive of Wheat Scheme, production :—

*Wheat Sales in Tons*

| | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|
| Native | | | | | | |
| Moshi | 219 | 49 | 9 | 20 | 3 | — |
| Arusha | 448 | 642 | 387 | 112 | 129 | 191 |
| Mbulu | 224 | 136 | 343 | ? | 142 | 145 |
| | 891 | 827 | 739 | 132 | 274 | 336 |
| Non-Native | | | | | | |
| Moshi | 298 | 658 | 482 | 477 | 673 | 1,145 |
| Arusha / Mbulu | 2,033 | 3,216 | 2,067 | 2,277 | 767 / 545 | 545 / 1,636 |
| | 2,331 | 3,874 | 2,549 | 2,754 | 1,985 | 3,326 |
| Grand Total | 3,222 | 4,701 | 3,288 | 2,886 | 2,259 | 3,662 |

"Kenya Governor", now rather a mixture, continues to be the main variety grown and among others may be mentioned "Reward", "261 B", "192", "Sabanero" and "294". The Agricultural Officer, Arusha, in co-operation with a local farmer, carried out observations on a new series of wheats bred for short season conditions and two of these are likely to be of value in replacing some of the varieties at present grown. Also included in these trials were three strains of "294" and one of "261" but, of these, only "294 B, 2.A.3" is likely to be of value, the other three being susceptible to rust damage.

### OTHER GRAINS

Besides maize and wheat the only other grain crop of importance in the Province is Eleusine millet which is grown extensively on Kilimanjaro for the brewing of beer. Both the rain-grown and irrigated crops on the southern slopes were good but in the east of the mountain the crop was only fair owing to lack of rain. Small crops of rice were harvested in the Mbugwe area of Mbulu and the Rau area of Moshi but nothing reached the market.

### PULSES

The only pulse crop of any importance in the Province (apart from seeds for export) is the French bean and this is grown very largely for local consumption. In 1948 there was a surplus for sale of 617 tons (nearly all from Arusha district) but a great deal of this was made up of rejects from the non-native seed bean industry. White haricot beans are grown to some extent by natives in the East Kilimanjaro area and 118 tons were marketed during the year. There was a small acreage of cowpeas in the lowland areas of Moshi but nothing was marketed.

### BANANAS

Poor rains caused a reduction in the yield of bananas on Meru and Kilimanjaro, particularly East Kilimanjaro where owing to lack of shade and shelter there was a good deal of leaf damage and scorching. In November Professor Baker and Mr. Simmonds of Trinidad visited the Moshi district in search of varieties of bananas which might be of use to them in breeding for resistance to Panama disease. Five varieties (Mchare, Mnyenyele, Ndishi, Makifui and Kitarasa) were chosen and suckers later collected by the Agricultural Officer for transmission to Trinidad via Amani and Kew.

## ROOT CROPS

European potatoes were in short supply at various times during the year. The Rongai short rains (1947/48) African-grown crop was small owing to drought and only about 40 tons reached the Moshi market. Potato riddles were supplied to this area and the crop was graded before marketing. This practice is being continued for the 1948/49 crop which is expected to be somewhere between 500 and 1,000 tons, a considerable portion of which will probably filter over the border into Kenya. Good crops were reaped on the Polish farm and one or two other estates in the Arusha district and total sales in the Province for the year amounted to 226 tons.

## COFFEE

*General.*—The following are the statistics of coffee production in the Northern Province over the past five seasons :—

*Parchment Coffee Production (Tons)*

| Native | 1943/44 | 1944/45 | 1945/46 | 1946/47 | 1947/48 |
|---|---|---|---|---|---|
| Moshi | 2,120 | 3,886 | 3,102 | 2,318 | 4,235 |
| Arusha-Mbulu | 73 | 198 | 94 | 161 | 194 |
| | 2,193 | 4,084 | 3,196 | 2,479 | 4,429 |
| Non-Native | | | | | |
| Moshi | 988 | 1,027 | 1,551 | 149 | 1,370 |
| Arusha-Mbulu | 1,258 | 1,531 | 1,441 | 678 | 1,265 |
| | 2,246 | 2,558 | 2,992 | 827 | 2,635 |

The 1947/48 crop was the first to be sold under the five-year contract with the Ministry of Food. The contract called for separate specifications for native and non-native coffees but after negotiations between the Moshi Native Coffee Board and the Ministry the latter have agreed for the 1947/48 crop to be marketed under a single schedule.

All Tanga and Northern Province coffees were cured by the Tanganyika Coffee Curing Company, Limited, of which the Moshi Native Coffee Board and Tanganyika Coffee Growers' Association are equal shareholders. The Company has carried out considerable extensions and improvements to the old coffee curing works and further extensions are contemplated which, it is hoped, will enable the works to process and bulk a crop of 8,000 tons.

*Native Coffee.*—The Moshi native coffee crop in 1947/48 was the largest on record, totalling 4,235 tons parchment, which represents a yield of close on five hundredweights per acre. There is a slow but sure improvement taking place in quality, mainly through better methods of preparation, and the fact that the Ministry of Food have now agreed to a common schedule and specification for both native and non-native coffees should stimulate further improvement. Fifty-one per cent of the crop was placed in the top half of the classification table compared with forty-five per cent in 1946/47.

The 1948/49 crop promised fairly well early in the season but owing to very dry weather from July to November this promise has not been realized and it is estimated that the crop will be only about 3,200 tons.

The Moshi Native Coffee Board has concluded its third season of activity and published a comprehensive report and balance sheet covering its operations for the year 1947/48, as well as estimates for the year 1948/49. The Board's

levy on parchment coffee remained at the 1946/47 figure of £9 per ton. In addition to its routine functions of instructions, pest control, etc., the Board got the new coffee school going during 1948 and commenced work at three of the proposed ten propagation centres. An officer of the Agricultural Department (Mr. B. R. D. Eccles, Agricultural Assistant) was seconded as Headmaster of the school and took up his duties in October, 1948. An attractive and useful booklet entitled "All about K.N.C.U. Coffee" was published by the Board during the year.

*Estate Coffee.*—The five-year coffee contract with the Ministry of Food and the uncertainties surrounding the papain and pyrethrum markets have all stimulated coffee planters to renew their interest in the crop. Neglected and uneconomic coffee is being uprooted and nurseries have been prepared with seed from selected material. Before the war the production of estate coffee rarely fell below 3,000 tons per annum and invariably exceeded native production but in 1942 the position became reversed and has remained so ever since, with the gap steadily becoming wider.

In common with native coffee the 1947/48 estate crop was good and reached 2,635 tons parchment but dry weather in 1948 will reduce the 1948/49 crop to about 1,200 tons.

### ONIONS

In spite of not entirely favourable weather, and difficulties in obtaining seed, onion production was maintained at a satisfactory level and exports from the Province were just over 2,000 tons. Exports (in tons) for previous years were :—

| District | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Moshi ... ... ... | 1,156 | 875 | 740 | 991 | 830 |
| Arusha-Mbulu ... ... | 764 | 1,325 | 943 | 967 | 1,255 |
| | 1,920 | 2,200 | 1,683 | 1,958 | 2,085 |

The voluntary organizations for grading for export at Moshi and Arusha were continued and prices ranged between Shs. 5/- and Shs. 9/- a frasila with an average of about Shs. 7/50 which is equivalent to fifty cents more than in 1947.

The onion seed position has been growing steadily worse since the middle of the year when it was still possible to import small quantities by parcel post or with passenger's baggage. Small quantities are produced locally but these are not nearly enough to maintain production as its existing level.

### SUNFLOWER

Seven tons of sunflower seed were distributed for trial, mostly to Africans, and the results have been very encouraging. The quantity marketed was 101 tons which includes non-native production. A considerable expansion of the crop is expected to take place next season ; in the Moshi district alone non-natives have programmed 1,500 acres but some of this may of course be for stock feed.

### COTTON

Cotton cultivation has been on the wane in the Northern Province since 1942, culminating in a crop of only 79 tons of seed cotton in 1948/49, compared with a pre-war output of round about the 1,000-ton mark. Admittedly the 1948 rains were not conducive to a good crop but it is apparent nevertheless that, without exhortation, Africans are not inclined to plant cotton as they

do not consider the cash return commensurate with the trouble involved. Also, in a good many places, reasonable yields can only be obtained by irrigation after the rains. It is probable, however, that the big increase in last season's price (from 41 cents a kilo to 58½) will stimulate further interest in the crop.

*Seed Cotton Purchases in Kilograms—1948/49*

| District | A Grade | C Grade | Total | Payment Shs. | Cts |
|---|---|---|---|---|---|
| Moshi ... ... ... ... | 64,144 ... | 9,796 ... | 73,940 ... | 39,237 | 11 |
| Arusha ... ... ... ... | 2,773 ... | 463 ... | 3,236 ... | 1,705 | 54 |
| Mbulu ... ... ... ... | 1,354 ... | 518 .... | 1,872 ... | 810 | 45 |
| | 68,271 ... | 10,777 ... | 79,048 ... | 41,803 | 10 |

*Seed Cotton Purchases in Tons—Previous Years*

| District | 1936/37 | 1944/45 | 1945/46 | 1946/47 | 1947/48 | 1948/49 |
|---|---|---|---|---|---|---|
| Moshi ... ... | 880 | 95 ... | 107 ... | 154 ... | 186 ... | 74 |
| Arusha ... ... | 62 | 33 ... | 13 ... | 9 ... | 3 ... | 3 |
| Mbulu ... ... | 130 | — ... | 32 ... | 25 ... | 19 ... | 2 |
| | 1,072 | 128 ... | 152 ... | 188 ... | 208 ... | 79 |

*Seed Cotton Prices per Kilogram—1948/49*

| | A Grade | C Grade |
|---|---|---|
| Moshi and Arusha ... | 58½ cts. ... | 18 cts. |
| Mbulu ... ... ... | 54½ cts. ... | 14 cts. |

SUGAR

There was a further drop in sugar production at Arusha Chini from 7,506 tons to 6,088 tons (5,860 refined and 228 unrefined). There should be a substantial increase in future output as the Company are now reducing the number of ratoons from about ten to four or five. Excellent results have been achieved, on an experimental scale, in combating alkalinity and work is still in progress to find the least expensive way of applying the results. A consignment of toads (*Bufo marinus*) was received from Trinidad for use against the Sugar Cane grub.

SEEDS FOR EXPORT

The export seed industry continues to flourish and during the year 1,685 tons of beans and 63 tons of peas, as well as several tons of vegetable and flower seeds, were exported. These figures include a carry over of about 150 tons from the 1947 season but as there will be a carry over of some 300 tons of the 1948 crop the figures can be regarded as a sufficiently accurate indication of the year's production. The value of these seeds was £90,000 compared with £25,470 for 1947 (production 560 tons). Practically all of the bean, vegetable and flower seed was produced in Arusha district (including Masai) but about two-thirds of the pea seed was produced in Moshi.

The weather favoured the production of better quality seed than in 1947 when excessive rain caused a good deal of disease in the bean crop. The larger growers are turning more and more towards mechanical methods of cleaning, grading, polishing, etc. The Export Seeds Ordinance, 1947, was implemented during the year by the appointment of a Board and the making of orders regarding treatment of seed and the collection of a levy. The latter is at present collected at the rate of 50 cents a hundredweight on beans and peas, Shs. 3/75 on vegetable seed and Shs. 5/- on flower seed.

### SISAL

The sisal crop was not greatly affected by the rather dry year and, machinery and labour conditions being rather easier, the output exceeded that of 1947. The following figures show the tonnage produced over the past five years :—

| District | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Moshi ... | 2,669 | 2,875 | 3,380 | 2,053 | 2,300 |
| Arusha ... | 2,191 | 2,649 | 2,506 | 2,714 | 2,800 |
| | 4,860 | 5,524 | 5,886 | 4,767 | 5,100 |

### PAPAIN

After climbing steadily to reach a peak of Shs. 31/- a pound in April, 1947, the price of papain has, since then, been dropping just as steadily till at the end of 1948 it had reached the pre-war price of Shs. 8/-. The result is that a high proportion of the land planted to pawpaws in 1946 and 1947 is being neglected and fresh plantings are only taking place where inter-cropping is possible. Several attempts have been made to discover a formula with which to regulate the industry so that the market could be maintained. These efforts have failed for various reasons, the chief of which are world over-production and the reluctance of American buyers to recognize any form of Tanganyika grading. There is of course also the important consideration that at present low prices, the uncertainty of the future and dwindling production the industry could not afford to risk capital on setting up an organization for grading.

Weather conditions were not favourable for pawpaw production and the light rains followed by very dry conditions caused almost complete defoliation in many areas. Exports of papain totalled 111 tons which is just three tons over 1947 exports; slightly over half of the production came from Moshi district and most of the remainder from Arusha, with a little from Mbulu.

### PYRETHRUM

Practically all the pyrethrum in this Province is produced in Arusha district and the Agricultural Officer of the district reports as follows :—

> "The concern felt for pyrethrum growing prospects at the end of 1947 was happily relieved by the fact that towards the end of the year the Pyrethrum Board of Kenya was able to dispose of all of the 1948 crop and a substantial proportion of the 1949 crop at a twenty-per-cent increase in price. Earlier, the Government had agreed to finance the purchase of the 1948 crop. With the prospects for pyrethrum now much brighter, attention has again been directed to increasing production and a scheme to utilize more land in the forest reserve has been discussed but not yet brought to finality."

Production over the past five years is as follows :—

| Year | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|
| Tons ... ... | 201 | 306 | 298 | 204 | 101 |

## Pests, Diseases and Vermin

*Maize.*—The maize crop was comparatively free of pests and diseases but a widespread outbreak of Army worm which appeared in December, and which did considerable damage to pasture, gave some cause for anxiety lest it should not have disappeared by the time the new maize crop brairded in February or March, 1949.

*Wheat.*—The wheat crop was unusually healthy but the following forms of Black Stem Rust were recorded: K1, K2, K6, K7 and a new form K8. "Foot rot" (*Helminthosporium sativum*), which appeared in Arusha in 1947, did not again appear there but was recorded at Sanya Juu in the Moshi district. Army worm did some slight damage in the Ngare Nairobi area of Moshi.

*Coffee.*—Few crops are so beset with major pests and diseases as coffee and few respond so well to control measures, among which are a number of highly efficient modern sprays and dusts capable of effecting great improvements in yield and quality. Poison baiting of Antestia is now a regular feature of Kilimanjaro native coffee culture and is done under the ægis of the Native Coffee Board after pruning and after the main rains. In Arusha district the Agricultural Officer has been trying out the Entomologist's D.D.T. soap-paraffin emulsion on a considerable scale with success and European planters have also reported good results. Besides destroying Antestia this spray is also said to be fairly efficient against Thrips and Capsides and an added advantage is that it can be combined with Bordeaux mixture.

There was no let-up in the campaign against stem borer both by the enforcement of cultural measures and mechanical extraction. The use of E.D.C.T. mixture against this pest is reported by the Agricultural Officer to have been popular among both natives and non-natives.

*Bananas.*—The banana weevil did appreciable damage in certain parts of the Moshi district, particularly below Old Moshi and at Kahe.

*Onions.*—There was as usual some damage by Thrips in the onion crop but this was not unduly heavy.

*Pawpaw.*—There was a good deal of disease in pawpaw, aggravated by the neglect of plantations following on the papain slump. *Ascochyta caricæ*, *corulariopsis papayæ* and a new form of wilt were all common in the crop.

## Soil Conservation and Land Usage

The posting of the Senior Agricultural Officer (Soil Conservation) to Arusha, in April 1948, has stimulated a great interest in land usage among estate owners who are not only seeking advice, but what is more important, carrying out such advice on an increasing scale. The presence of the soil conservation section has also been of great value in advising on African soil conservation problems which in congested areas like Kilimanjaro, Meru and Mbulu are serious and pressing.

Reports from the districts are as follows:—

*Moshi.* "Eighteen soil conservation instructors were sent to Rombo in September in order to ensure the repairs on existing contour banks were being carried out, and also to construct new banks where needed. Planting with Coleus on the banks was carried out and gaps were filled in old banks where necessary. Routine measures enforcing the prohibition of cultivation on steep slopes and near gullies or river valleys was carried out but instructors are spending too much time on this and more co-operation is needed by the 'Wakilis'."

*Arusha.* "The increasing interest taken by estate owners in the care of their land has been maintained but there are a number of black sheep still to be found. These consist more of the speculator-type of land owner who is content to take off a few lucrative crops and then sell or sub-let his land. The switch over to dairying rather than ranching in the drier

areas has continued, and steps are being taken to organize and improve the production, and marketing of clean milk and high grade poultry, eggs and other by-products of the daily industry. All this has stimulated interest in the improvement of pastures and fodder crops.

With the posting of an Agricultural Assistant to the district it has been possible to devote more time to African soil conservation matters than in former years. It has also been possible to make use of the (recently instituted) native administrative organization to press home propaganda and to discuss projects. With the assistance of Olkarsis Simeon of the Wa-Arusha, a demonstration of terracing was laid out near his house, and a good deal of information has been collected regarding slopes, density of population and stock, and crops grown.

The extension of cultivation into the more outlying areas of the district mentioned in the last annual report has continued, and many of the younger men are settling there and building their houses. This has created a demand for water which is to be piped from higher up the mountain. The amount of such land still available is not great and further depletion of grazing reserves and the deterioration of the pastures through over-grazing has raised new problems which will have to be solved in the near future. A similar problem has had to be faced with the dam constructed at Musa.

A great deal of opposition and prejudice has still to be overcome before we can receive the wholehearted co-operation of the people themselvs and the main lines of our approach are still confined to propaganda, demonstration and the search for volunteers to lead the way."

*Mbulu.* "The granting of funds for land rehabilitation has made it possible to engage staff and get on with work which for many years has been known to be urgently necessary. Pressure on land in over-stocked areas has to be relieved by moving humans and stock off these areas before they are completely destroyed. Then people remaining on the old areas, and those moving to new areas, will have to adopt, and stick to, better methods of crop and animal husbandry.

Surveys are being made of the Iraqw and Ufiomi areas at present in use, and a census of cattle and small stock has been completed. From these figures and the present state of the grazing it will have to be decided to what extent each area must be destocked. Considerable clearings have been made during the past dry season (seventy-five square miles in extent) in Ufiomi, Barabaig, South, Central and North Iraqw to open areas to grazing.

Teams of instructors have been trained and started on putting contour banks across all cultivated land. A large portion of the Daudi area has been completed, and the team divided into three sections and posted to Ufiomi, South Iraqw, and North and Central Iraqw, in which areas work has now also commenced.

It is important to recognize that over-stocking is ninety per cent of the land problem, and that a very considerable reduction of stock is absolutely necessary. It is equally important to set a limit to the number of stock to be kept in each area, and to enforce its observance in future until the carrying capacity of the district is improved.

The human population appears from census figures to be doubling itself in twenty-five years. Destocking down to a reasonable figure, by selective culling which is necessary to save the soil, will produce more milk, more calves, and more meat to help feed the increasing population, and is in fact the only stock policy possible. We shall also have to take steps to make the shambas produce more per acre."

### Development Plan

In addition to the Mbulu development scheme, which does not come directly under the Agricultural Department and which is referred to briefly above, the under-mentioned projects are also financed from Development Funds.

*Improvement of Furrows in Moshi Lowlands.*—The object of this scheme is to improve existing Chagga furrows with a view to preventing wastage of water and getting it further down towards the proposed expansion area. The work, which involves the construction and repair of intakes, culverts, retaining walls and linings, was commenced in July and for six weeks was supervised by an officer of the Water Development Department after which it was taken over by an Agricultural Assistant working under the supervision of the Agricultural Officer. The Native Authorities undertook to supply unskilled labour, stone and sand free of cost but this arrangement has not been entirely successful and the work was at times almost at a standstill owing to shortages of labour. Twelve furrows were completed during the year at a cost of £1,100, the greater part of this being expenditure on cement and masons' wages. The total amount available for this scheme is £2,000.

*Soil Conservation, Eastern Kilimanjaro.*—It has not been possible to spare the services of an Agricultural Assistant to get this scheme properly going and work has been confined mainly to the construction and repair of contour banks and the regrassing of gully tops and sides under the supervision of a gang of African levellers.

*Housing for African Instructors.*—Ten permanent houses were erected for Instructors in the Moshi district; the work was put out to contract and was completed in September.

*Training of Agricultural Instructors.*—This scheme is referred to in paragraph 5 of this report.

*Improvement of Planting Material.*—One hundred and eighty-five deciduous fruit trees were imported from South Africa and planted at the Moshi Native Coffee Board's propagating centres on Kilimanjaro.

*Mechanical Cultivation Scheme.*—This scheme has been shelved for the present as it is considered it would be more appropriate for it to form part of the proposed Chagga Expansion Scheme in the Moshi lowlands.

### Land Settlement

New non-native settlement has been confined mainly to the Oldeani area where nineteen of the twenty-six farming units available have been allocated and twelve are already in occupation. The boundaries of the ex-German farms at Ngare Nairobi and Sanya Juu have been re-drawn to form "economic" farm units within the non-native block proposed in the Wilson Report. Ten of the sixteen units are occupied on short leases pending the Secretary of State's decision on the report. The fate of the much debated short-term

Rights of Occupancy at Loljoro, near Arusha, was still undecided at the end of the year but the probability is that this block of about 20,000 acres will also be divided into economic holdings and leased for a period of thirty-three years.

As far as native settlement is concerned there is little to report and it was obvious that it would have been premature to have made any definite plans for the Moshi and Arusha districts until the final decision regarding the Wilson Report was known. The Rau-Himo expansion scheme for the Chagga, which was drawn up just before the war is still in abeyance and it is possible that the impending acquisition of some of the ex-German land on the mountain by the Chagga may further retard its implementation by making calls on staff, etc. Two ex-German farms in Moshi were leased on an annual basis by the Custodian of Enemy Property for African maize growing.

### Production Committees

*Moshi.*—Twelve meetings of the committee were held during the year and most of the members attended a joint meeting at Arusha in August at which the Member was present. £15,238 was paid out in machinery loans (fourteen farmers) and £3,950 in crop loans (seven farmers). Breaking grants at Shs. 20/- per acre were paid in respect of 809 acres and two claims for minimum returns in respect of the 1948 season were received. Acreages of the main annual crops planted, as shown in planting programme for 1947 and 1948, were :—

| | 1947 | 1948 |
|---|---|---|
| Maize ... ... ... ... | 8,174 | 8,300 |
| Wheat ... ... ... ... | *6,000 | 6,900 |
| Beans Posho ... ... ... | 480 | 600 |
| Beans (seed) ... ... ... | 149 | 550 |
| Peas (seed) ... ... ... | 10 | 200 |

*Inclusive of Wheat Scheme.

*Arusha.*—The committee held twelve ordinary meetings and one joint meeting, referred to in the previous paragraph. £26,420 was paid out in respect of forty-three machinery loans and £9,400 in respect of eighteen crop loans. Breaking grants to the extent of £3,124 were paid and crop failures cost £1,778 in minimum crop return payments.

*Mbulu.*—The Mbulu Production Committee held its first meeting in December, 1947, and met on ten occasions in 1948. There is a feeling that Mbulu district should come under the Arusha committee with say three members drawn from Mbulu. The reason for this is that the two settler communities are at opposite ends of the district and farmers visit Arusha more frequently than Mbulu, which is remote from both settlement areas.

### Agricultural Stations

Apart from the Coffee Station which is responsible direct to Headquarters there are no experimental or other agricultural stations run by the Department although several have been projected for a number of years, viz., Chagga Investigation Centre (Lyamungu), Rau-Himo Investigation Centre (near Moshi), Instructors' School (Lyamungu) and (more recently) Tengeru Experimental Station.

The Moshi Native Coffee Board's Propagating Centres and its Coffee School have been mentioned earlier in this report and of these two enterprises the Agricultural Officer, Moshi, writes :—

"*Propagating Centres.*—The trial of mother trees and clonal material planted at Kirua-Vunjo and Kibosho centres are doing fairly well. There are a few gaps in the clonal trial which will be filled early next year. The fruit trees on order from South Africa arrived in July, also September, and were planted out at Lyamungu, Kirua-Vunjo and Kibosho propagating centres. At each centre five trees of three varieties of Plum, Peach and Apple were planted. Four peach trees appear to have died, they are probably past recovery now, and two apple trees at Kirua-Vunjo have been stolen. The thief, or thieves have not yet been found. Two hundred and twenty pounds of selected coffee seed from the Coffee Research Station, Lyamungu, were planted at five propagating centres in April, 1948. Most have done well but at Usseri they are, on the whole poor and do not seem to have been looked after very well. Owing to an unfortunate misunderstanding no seed will be forthcoming from Lyamungu this year for further planting."

"*Coffee School, Lyamungu.*—The school has been completed and Mr. Eccles, Agricultural Assistant, has been seconded to act as Head Master. He arrived in October and a six weeks preliminary course was started for the twenty-seven pupils. A School Committee has been formed to discuss management and syllabus. The latter has largely been based on the Ukiriguru Syllabus but with an emphasis on coffee. The first two-year course will commence in January. The school was officially opened on 6th January by the Provincial Commissioner."

*Other Experiments.*—In addition to the trials of wheat varieties mentioned in paragraph 18 experiments are also being conducted in the Ol Motonyi area by the Agricultural Officer to discover the effect of Manganese on coffee.

There is a central farm embodied in the Mbulu Development Plan on which simple observations will be carried out on new crop varieties and on cultural practices during the 1949 season.

## Machinery

At the beginning of the year the Agricultural machinery position was still unsatisfactory but the position was alleviated to some extent by the release of machinery from the Wheat Scheme. The supply of wheeled tractors has steadily improved and by the end of the year there were no outstanding applications. There is still an acute shortage of disc ploughs and there are about thirty-five farmers on the waiting list for crawler tractors. There are now two self-propelled combine harvesters in use in the Moshi district.

## Labour

The Northern Province Labour Utilization Board worked smoothly during the year and there were fewer complaints about labour shortages in the Province. The Board's Executive Officer's report for 1948 shows 8,635 recruits as having been brought to the Province during the year compared with a total of about 25,000 labourers employed in Agriculture in the Province. He gives the interesting fact that the average gain in weight of recruits during their first six months in the Province was seven pounds.

## Miscellaneous

*Arusha Show.*—A very successful Agricultural Show was held at Arusha on 4th, 5th and 6th November and, as a first effort, reflected great credit on its organizers. The Agricultural Officer was a member of the committee and put in many weeks of hard work towards its success. The Agricultural Officer, Moshi, took over a strong entry of native produce which took seven first prizes and six seconds in the thirteen produce classes. Arusha and Mbulu, on the other hand proved the stronger in the native handicrafts section. Estate produce reached a very high standard and the displays by Government departments, experiment stations, etc., proved popular and instructive.

*Communications.*—The alignment of the proposed Namanga-Taveta tarmac road has been decided upon and demarcation is expected to commence early in 1949. Overseas Food Corporation traffic, using five-ton Diesel lorries, has caused the Moshi-Arusha-Babati road to become a nightmare to motorists owing to the deep corrugations which now exist on practically every yard of the route. These lorries are engaged in transporting sectional houses from Moshi to Kongwa. The resuscitation of the Moshi-Sanya Juu railway project has again been mooted and is at present under consideration by the Moshi Production Committee.

## Conclusion

In spite of the fact that the season's rainfall was below average, particularly in the Moshi District, 1948, has been, by and large, a very successful year for Northern Province agriculture. The output of grain crops, coffee and "seed for export" has risen in quantity and value and pyrethrum is showing welcome signs of a come-back. The one black spot was papain which, although at one time it seemed destined to take a high place in the economy of the Province, was completely in the doldrums at the end of the year.

There is still, in all districts and among all races, an unhealthy tendency towards a one-crop economy but there are signs, at any rate among the non-native community, of a growing awareness of the danger of this policy to the land and of the immediate financial risks involved. We are still in the transition stage from war to peace and new non-native settlers are as yet uncertain of their position in relation to the land they occupy: this, together with shortages of labour and equipment, has not formed the ideal background for serious attention to correct land usage and good farming but with a clarification of the tenure position and improved supplies, it is reasonable to look forward to progress in 1949 with confidence.

R. D. Linton,
*Provincial Agricultural Officer,*
*Northern Province*

*Weather.*—The Tanga Province is diversified because it contains high mountainous conditions both wet and dry, medium altitude foot hills, arid plains and coastal areas. In all these varied conditions, except one, the season's rains were a little less than in 1947 but were better spread and the crop seasons were generally excellent. The exception was the Pare District where the North Pares experienced a severe drought and the South Pares a partial drought.

## Crop Production

*General.*—The year 1947 has been a good crop year and in spite of the two bad seasons prior to that, memory is short, and there was a tendency to slip back in 1948, and rest on the food balances from 1947. The drive for food planting was got under way early, however, and plantings eventually were generally well up to time except on parts of the coast. The excellent rains coupled with the efforts of all concerned contributed to establish what is probably a record, for it is apparent at the close of the year that the Province, always the Territory's heaviest importer of grain, has this year very likely produced for itself a full year's supply. The estates produced a third of the needs and the Africans of Handeni and Korogwe were responsible for the balance. It must be realized that 62,060 tons of sisal, well over 50 per cent of the total sisal production of the Territory, was made in the Tanga Province in 1948, and that the average labour force working on sisal amounted to practically 64,000 men all of whom have to be fed. In addition the township of Tanga is a large consumer and in the past the Pare, Lushoto and Handeni districts often imported food for the African population.

In the arid areas where drought prevailed, cassava proved its value for no importations of food had to be made to such areas.

*Tanga and Pangani Districts.*—The rainfall was well distributed and growth of all crops flourished. The usual drive to maintain cassava acreage was carried on vigorously throughout the year. It will be recollected that it was reported last year that the Native Authorities would, with the assistance of Native Authority Instructors, take on the supervision of food planting. The chiefs, however, fell down at planting time without the drive of the Agricultural Instructors behind them. At the commencement of the planting season the usual delays occurred and when the season had become dangerously late the Agricultural Instructors had to be put to this work again to carry on the drive as in former years. At the close of the year the Native Authorities are being pushed hard by the District Administration to do their jobs adequately and there is every hope that ultimately the Agricultural Instructors can be taken out to be put on to coconut sanitation and other similar work and the Native Authorities carry on with the food planting.

Work on coconut and copra has also been maintained throughout the year but not at the rate that was desired as so many instructors had to be kept on food production. However, progress can be recorded although there is still room for a very great deal of improvement.

*Pare District.*—Food production continued to be pushed vigorously in 1948 especially the planting of cassava and there was a large increase in acreage of this crop particularly in the mountain areas of both the North and South Pares. Where it was found unsuitable to plant cassava, sweet potatoes were encouraged. Mtama seed was obtained at the beginning of

the year and was distributed in the Western foothills of the South Pare as this area is rather too dry for maize. The almost complete failure of the long rains in the Western and Eastern foothills of the North Pare and the Western foothills of the South Pare resulted in the failure of practically all crops except cassava. The result of this was a bare sufficiency with some supplies going from the Southern areas to help, but no food had to be imported into the Pare District. The Pare District was really the only black spot in the whole Province as far as crop production was concerned but the wisdom of pushing cassava in 1947, and continuing in early 1948, even though the people were extremely unwilling at the time, saved the situation.

*Lushoto District—Korogwe Division.*—The low lying areas surrounding the Usambaras which comprise this division had an excellent season. All crops had been pushed hard and increased acreages of maize, cotton and rice all gave excellent crops with good yields.

*Lushoto District—Lushoto Division.*—The mountain areas were slow in starting off owing to long dry spells at the beginning of the rains but in spite of late planting the rains continued much later than usual and bumper crops were harvested everywhere. The acreage planted was increased owing to the firm attitude of the District Administration for the news was given out well ahead of the season that importation of food into the Usambaras would not occur as in previous years and that the people must plant adequate acreages to feed themselves. This attitude had its effect and the year has proved that the Usambara area can feed itself and must do so in the future using sweet potatoes as the famine reserve crop.

*Handeni District.*—The season was a good one and although rainfall was rather less than in 1947 it was much better distributed. Record acreages were planted everywhere and the crops exceeded all expectation being practically double those of 1947. There is no doubt of the success of the marketing system started in the District on a small scale in 1947 and extended in 1948 for the natives can now sell anything they grow and they have responded very well to all propaganda. The cassava crop has also increased and mtama growing is spreading, for, with the uncertain rainfall in Handeni it would be unwise to pin all faith on maize. A great deal of trouble was taken to ensure that sufficient maize was kept for food and for seed and that overselling did not take place. It remains to improve the agricultural methods of the people now that the acreage planted is adequate. It is fairly obvious that tie-ridge cultivation should be introduced and propaganda to that end is being commenced.

### Crop Production Details

*Rice.*—There are a great number of areas in the Province that are suitable for rice and the drive was continued to increase those that are already planted for most of these are capable of extension. For the last two years the Province has been not only self-supporting in rice, but has exported a fair amount. The total crop this year amounted to 2,017 tons of paddy from all areas. This was less than was expected, for the Pare District gave only 1,200 tons when the acreage planted should actually have yielded 3,000 tons. The reduction was due to the failure of the rains in the Pare District and the consequent fall in the level of rivers from which water is obtained for irrigating rice. The consequence of this fall was that the planted areas,

at some distance from the rivers, could not receive water and the young plants shrivelled up and died.

The production in Korogwe and Handeni practically doubled itself owing to increased planting in all areas. The number of rice bunds was increased again in the Luengera Valley and these conserved the use of water and made for increased yields. There is no doubt that there is a great deal of room for further extension in rice cultivation particularly around the base of the Usambara mountains where there are many swamps that should be cultivated, but the people do not like going down from the mountains. However, with the increase in population that is apparently taking place economic necessity will no doubt force them to cultivate these swamps for rice within the next decade.

The figures for paddy production since 1942 are as follows :—

| | Pare | Korogwe & Handeni | Total |
|---|---|---|---|
| 1942 | 2,120 | 580 | 2,700 |
| 1943 | 1,370 | 390 | 1,760 |
| 1944 | 745 | 135 | 880 |
| 1945 | 606 | 159 | 765 |
| 1946 | 24 | 23 | 47 |
| 1947 | 1,583 | 425 | 2,088 |
| 1948 | 1,200 | 817 | 2,017 |

*Maize.*—Maize production in the Province exceeded expectation and the Province has produced a sufficiency of grain for its own needs. This is largely due to the production of Handeni District, the total of which was 6,416 tons actually sold up to the end of the year and it is estimated that a balance for sale of 800 tons has still to come in making a grand total for the season of approximately 7,200 tons. The Luengera Valley actually sold through markets 839 tons and it was estimated that a further 400 tons was bought by estates in the vicinity.

The response by the sisal industry to plant more grain was excellent. The planting was more wisely done and more care taken. The total acreage planted was 7,919 as against over 13,000 in 1947, but the areas that were not planted in 1948 were largely those unsuitable for maize growing, particularly along the coast. The actual yield averages were as follows :—

| | | |
|---|---|---|
| Tanga District | ... | 4·39 bags per acre. |
| Pare District | ... | 0·31 ,, ,, ,, |
| Korogwe District | ... | 5·21 ,, ,, ,, |

The Pare District, as mentioned above, suffered a severe drought and the grain harvested on estates was negligible. The Tanga District yield still included several estates that are marginal for maize growing and these brought the average yield down, but the suitable areas around Ngomeni and Mnyusi gave better yields than average. The Korogwe area shows only an average of 5·21 and this was brought down to that figure by inadequate preparation of land on the part of some estates through shortage of labour. Generally the estates in Korogwe that cultivated adequately and really practised the principles of good husbandry produced yields of 6·33 bags to 8·30. It will be seen from the figures below that the smaller acreage this year has given much better results than ever before. The figures from 1945 for estate maize are as follows :—

| Year | Acreage | Yield in tons |
|---|---|---|
| 1945 | 4,067 | 800 |
| 1946 | 8,280 | 960 |
| 1947 | 13,010 | 2,911 |
| 1948 | 7,919 | 3,564 |

*Cassava.*—The cassava acreage has increased throughout the Province. In previous years it has been mentioned that the Pare District lagged behind others in the planting of this essential reserve food crop but this year that District is ahead of the others and the people are actually beginning to like it. Without the large plantings of cassava in the North Pares this year, large importations of food would have been necessary to feed the people, and the hard work that is being put in by all concerned has been amply rewarded. In the Tanga and Pangani Districts the acreage was maintained and there, also, the people were able to feed themselves and still sell a surplus to Tanga township. In the Usambaras, where land is very short, it is unfortunate that cassava is planted at all at the higher altitudes, as it takes two years to mature and occupies land which could be more usefully planted with sweet potatoes and a certain amount of propaganda is being carried out to bring about a change.

*Sorghums and Millets.*—The Bulrush Millet in the Boma peninsula of the Tanga District has again produced a good crop. The climate and soil are suitable and the people have little else except cassava that they can plant and they are becoming keen now that they have seen successful crops of millet for two seasons. Elsewhere on the coast an average yield was obtained but a lot of damage was caused by birds and because of this the crop was rather unpopular. Sorghum was introduced in the Pare District last year and in those arid areas a small crop was obtained in spite of the drought and it is being brought home to the people—that however bad a season sorghums will always give them something, where as it is only in the bumper year that they get a crop of maize and in a bad year they get no maize at all. In the Handeni District the crop is extending and a certain amount of sorghum was actually available for sale. The crop looks as though it may be extended in the drier areas but here again the people complain of the damage by birds. Seed is being obtained from Handeni, now that supplies are available, for planting in all the dry areas North of the Usambaras and elsewhere.

*Beans and Pulses.*—Plantings on the coast were good and local supplies found their way to estates but throughout the Province there has been a great shortage of beans and pulses this year. However, it is generally a fact that in the good grain years the bean crop is poor and this has been true of this season. Throughout the foothills of the Usambaras, in the Pare mountains and in the Handeni and Korogwe areas, the bean crops have been very small and sisal estates have felt the pinch in so far as beans are concerned. The only record of beans sold is a total of 168 tons passed through the markets but this is not a true figure as estates all over the Province bought direct from Africans whatever they could lay their hands on. The surplus cow peas for sale in Handeni amounted to approximately 150 tons.

*Sunflower.*—Seed was distributed at the beginning of the year in the Pares, Usambaras, the Luengera, Handeni and Muhesa. The crop failed in the Pares and little was harvested in Muhesa where no interest was shown, but in the Usambaras and the Pares the crop has come to stay. The production in the Usambaras was estimated as 100 tons but nearly all this was kept for food and for seed. This is the only oil crop the mountain people can grow and formerly they always brought coconuts, groundnuts and simsim from the coast for the oil needs of their diet. Now they have sun-

flower and the people are enthusiastic about planting it. It is thought that not much will come to the markets for sale in future as the people wish to eat it. The Handeni District sold thirty-one tons from the distribution of one ton of seed although not all this was planted. The crop there also looks like becoming a popular one but it will not be pushed, for, should it be extended, it can only be at the expense of grain. The total surplus for sale from all areas was forty-three tons.

*Potatoes.*—Up to 1943 potatoes were the most important food crop of the Usambaras, but in that year Irish Blight appeared and since then potatoes have maintained but a precarious existence in these mountains. Prior to 1943 the export ranged between 1,500 and 2,000 tons. This year 149 tons were exported from the Usambaras and a further thirty tons were sold locally.

In 1944 trials were commenced on the small Kungului farm in Lushoto of varieties resistant to Irish blight, bred at Corstorphine in Scotland. These trials were carried on apparently with success and by 1948 two selected varieties had remained free of blight and were multiplied up to 18,000 lb. of seed potatoes. On further planting in 1948, however, a new strain of blight appeared (now known as Strain E) and affected the product of the whole of the 18,000 lb. of seed, and all other promising varieties that had remained blight free up to 1948 succumbed as well. New varieties of potatoes bred for resistance to Strain E of Irish blight are in the course of being tried out at Corstorphine and shortly the work of testing these introductions will recommence. A detailed report on the work being carried out at the Kungului farm is attached as an Annexure to this report.

*Muhesa Orange Industry.*—The orange crop produced around Muhesa in the Tanga District is from the seedling trees of a great number of Africans spread over a wide area. The climatic conditions vary within the orange area and the trees are of different strains. The marketing of the oranges is run on a co-operative collecting system operated by means of a No. 2 Account of the Tanga Native Treasury. The agents for the operation are Messrs. Dalgety and Co., of Tanga. The oranges are purchased at different centres where orange markets exist. They are transported to a packing shed and from there are sold to Nairobi merchants and to sisal estates. Messrs. Dalgety carry out all the work and are paid in the form of a percentage on the cash they handle in disposing of the crop. There are two crops a year—the main crop being from mid-April to August, and the fly crop from October to December. The crop is subject to great fluctuations and regular marketing contracts are thus very difficult. In the war years the military authorities took all the oranges that could be produced but now it is becoming increasingly difficult to dispose of the crop as fresh fruit and to show a profit. The keeping qualities of the oranges too are extremely poor owing to the rough methods of harvesting employed by the Africans. Improvements in harvesting methods are being taught but this is naturally a slow business. The bruised oranges that come into the markets are carefully sorted before despatch but all bruising cannot be detected in the green type of orange produced and the wastage on sales in Nairobi rates as high as 20 per cent. With juice extraction this wastage should disappear and with the difficulties of obtaining juice from Palestine in recent months the Nairobi merchants have bought quantities from Muhesa. There is also an obligation upon the agents to buy all oranges offered and as these are all in different stages of ripeness a great number are too ripe to be sent away by rail but are suitable for juice.

In 1947 a loan of £750 was obtained from the Development Commission for the Native Treasury No. 2 Account and a pilot juice plant was set up for the production of pure orange juice for sale in Nairobi. The plant, which is very small and is truly a pilot plant to explore the intricacies of the juice business, has given a certain amount of trouble. Nevertheless, it has demonstrated that production of orange juice is by far the safest method of disposing of the orange crop of Muhesa if a full market can be found for all the juice that is produced.

During 1948 the main crop gave promise of consisting largely of small fruits but later rain swelled out the fruit to make a good marketable product. The crop was fairly large, being 1,290 tons. The main crop has the appearance of being early in 1949, but much will depend on the short rains. Disposal of the main crop this year was hindered by the falling off of fresh fruit orders from Nairobi and other towns due to competition from Uganda oranges which can sell at a lower rate being nearer Nairobi. In addition the crop ripened all at one time and insufficient machines for expelling juice, lack of labour and lack of storage for juice left a very high wastage of fruit. Some 440 tons had to be thrown away. The fly crop was disposed of mainly as fresh fruit but 1,900 gallons of juice were prepared. There was no wastage of the fly crop. During the main crop a 60-lb. sample of sweet orange oil was extracted. This produce, which apparently commands a purchase price of Shs. 10/- per lb. may prove to be a profitable side-line.

The production figures over five years were as follows :—

| Year | Main Crop Tons | Fly Crop Tons | Total Crop Tons | Juice Product Gallons |
|---|---|---|---|---|
| 1944 | 1,413 | 200 | 1,612 | — |
| 1945 | 1,411 | 85 | 1,496 | — |
| 1946 | 264 | 920 | 1,184 | — |
| 1947 | 278 | 515 | 793 | 3,020 |
| 1948 | 1,291 | 256 | 1,546 | 16,390 |

Other figures of interest are shown below :—

1948

| | Fruit purchased Tons | Fresh fruit Sales Tons | Fruit turned to juice Tons | Fruit discarded Tons | Juice produced Gallons |
|---|---|---|---|---|---|
| Main Crop | 1,290 | 557 | 224 | 444 | 14,490 |
| Fly Crop | 256 | 212 | 40 | — | 1,900 |
| Total | 1,546 | 769 | 264 | 444 | 16,390 |

Prices to growers per 1,000 lb. of oranges were as follows in grades :—

| | Muhesa | Within 12 miles | Over 12 miles |
|---|---|---|---|
| Over 2½" diameter | Shs. 18/- | Shs. 15/- | Shs. 12/- |
| Under 2½" diameter | Shs. 15/- | Shs. 12/- | Shs. 9/- |

Calculated on 1,000 pieces or 1,000 actual oranges the prices over five years have been :—

| | |
|---|---|
| 1944 | Shs. 5/41 per 1,000 oranges. |
| 1945 | ,, 6/81 ,, ,, ,, |
| 1946 | ,, 6/32 .. .. .. |
| 1947 | ,, 6/47 ,, ,, ,, |
| 1948 | ,, 8/10 ,, ,, ,, |

The financial position of the industry is not unsound at the moment though it is very under capitalizd. Fresh fruit selling, owing to loss in transit and bruising and over-ripeness, is unprofitable and in 1948 there was a loss on that side of the business. Juice production, however, showed a profit to offset the loss on fresh fruit and the whole account thus showed a small overall profit. The figures since 1944 are as follows :—

| | | |
|---|---|---|
| 1944 | ... ... ... ... ... | net profit £807 |
| 1945 | ... ... ... ... ... | net profit £759 |
| 1946 | ... ... ... ... ... | net loss £625 |
| 1947 | ... ... ... ... ... | net loss £540 |
| 1948 | ... ... ... ... ... | net profit £192 |

It is obvious that the industry must turn to juice for its main production and with this end in view a scheme for the capitalization of the industry is in course of preparation for submission to the Development Commission when all data on the technical side of juice production and juice storage are complete.

*Other Fruits.*—The production for sale of fresh fruit other than oranges amounted to 2,386 tons made up as follows :—

| | |
|---|---|
| Bananas exported from Pangani ... ... ... ... ... | 973 tons |
| Mixed fruit consisting of grapefruit, tangerines, lemons and pineappes, with some mangoes and pawpaw from Muheza ... | 1,379 ,, |
| Peaches, plums, strawberries and apples from the Usambaras ... | 34 ,, |

The mixed fruit from Muhesa has shown a large increase, the figures for the last five years are as follows :—

| | |
|---|---|
| 1944 ... ... ... ... ... ... | 242 tons |
| 1945 ... ... ... ... ... ... | 803 ,, |
| 1946 ... ... ... ... ... ... | 584 ,, |
| 1947 ... ... ... ... ... ... | 266 ,, |
| 1948 ... ... ... ... ... ... | 1,379 ,, |

Coconuts and Copra.—The purchases of copra rose a little this year. Figures for the last five years are as follows :—

| | |
|---|---|
| 1944 ... ... ... ... ... ... | 3,494 tons |
| 1945 ... ... ... ... ... ... | 3,804 ,, |
| 1946 ... ... ... ... ... ... | 3,786 ,, |
| 1947 ... ... ... ... ... ... | 2,684 ,, |
| 1948 ... ... ... ... ... ... | 2,870 ,, |

Milling figures for the year were as follows :—

| | |
|---|---|
| Copra milled ... ... ... ... | 1,927 tons |
| Coconut oil ... ... ... ... ... | 1,153 ,, |
| Coconut cake ... ... ... ... | 611 ,, |

Pangani mill produced fifty-seven tons of coconut oil.

The controlled price of copra for the year was Shs. 8/75 per frasila at the mill and transport charges and agents' commission are supposed to be deducted. In actual fact growers near Muhesa have received as much as Shs. 9/- per frasila. The price of coconut oil was Shs. 16/90 per 36 lb., naked until May when it was raised to Shs. 17/20.

The Gombero Coconut Scheme, foreshadowed last year, was initiated towards the end of the year. This is a scheme designed to become a co-operative effort later, and is to turn coconuts into copra. It visualises taking the copra making right out of the hands of the peasant producer, by buying nuts, maturing them, turning them into copra in efficient kilns under competent supervision and then selling the highest class copra. The scheme is

financed by a loan to the Native Treasury by the Development Commission for working expenses and the capital is a grant from the Development Commission. A temporary house is being built at the site of the kilns so that European supervision can be supplied and it is hoped that the kilns will be completed early in the new year and copra manufacture commenced.

A great deal of activity took place throughout the year by all departmental staff in the Tanga and Pangani Districts to try and clean up coconut plantations. Many of the plantations both large and small are overgrown with bush and contain many stumps and dead trees which harbour coconut beetle. Eight cases against non-natives in the Magistrates Court and 341 cases in Native Courts were brought during the year.

The planting of the seedlings from selected palms which took place on the small plot at Boza near Pangani last year suffered some loss from coconut beetle. This is due to the exposed site and infection comes from shambas upwind some distance away. Actually, 900 adult beetles have been caught in the plantations and twenty-one trees died during the year from coconut beetle injury. These have been replaced. Tropical kudzu vine has been planted in the plantation and small plantings were made of pigeon pea. A small crop of sunflower was taken between the trees. This plantation of selected seedlings is doing well and will make a good demonstration as the trees become older.

*Cotton.*—The cotton crop in the Pares was almost a complete failure owing to drought but in Korogwe and in Handeni rainfall was excellent and although the crop was planted late, late rains matured it and gave very good yields. Planting throughout the Province in the cotton areas was increased although the Handeni District was more occupied with food planting and the cotton acreage was smaller than was originally thought. In the Handeni District a great deal of care has to be exercised in pushing cotton planting, for should the propaganda be too intense the more necessary food planting would be affected.

The following are the figures for the 1948 crop:

SEED COTTON IN TONS

| | Grade I | Grade III | Total | Paid to Growers Shs. | Cts. |
|---|---|---|---|---|---|
| Lushoto ... ... ... | 159,058 | 27,538 | 186,596 | 98,007 | 59 |
| Handeni ... ... ... | 196,203 | 47,390 | 243,593 | 119,523 | 87 |
| South Pare ... ... ... | 72,085 | 14,794 | 86,879 | 44,833 | 69 |
| North Pare ... ... ... | 11,243 | 2,476 | 13,719 | 7,023 | 92 |
| | 438,589 | 92,198 | 530,787 | 119,388 | 87 |

Production, over the previous eight years, of seed cotton in tons was:—

| | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 | 1948 |
|---|---|---|---|---|---|---|---|---|---|
| Pare District ... ... ... | 1,323 | 480 | 1,078 | 422 | 335 | 52 | 96 | 159 | 101 |
| Handeni District ... ... | 1,105 | 890 | 155 | 153 | 35 | 24 | 81 | 61 | 244 |
| Korogwe District ... ... | 309 | 171 | 259 | 127 | 50 | 14 | 25 | 45 | 187 |

*Coffee.*—The total crop of the Usambaras amounted to 137 tons of which eighty-two tons was African production and fifty-five tons plantation. These figures are for parchment coffee. The non-native crop continues to fall owing to the scarcity of labour in the Usambaras and probably the excessively acid

nature of the soil which has always been accepted as a limiting factor in coffee growing in the Usambaras. The African crop, on the other hand, continues to rise for the acreage planted by the individual African being smaller can be more selective and if yields are low he has no expenses so that his low yield is not a limiting factor.

The sale of the Usambara African crop is operated co-operatively on a No. 2 account of the Native Treasury. The account is supervised by this office. An increased price was paid to the African for his coffee this year owing to the good prices obtained, and the out-turn of the fifty-one tons of parchment sent to the Coffee Curing Works was 41·8 tons of clean coffee which fetched an average price, available for distribution of £123 per ton coffee, or approximately £100 per ton parchment. A certain amount of this was paid to reserve and the African received Shs. 1/40 per kilo for his parchment coffee. The Pare African crop amounted to 29·93 parchment. It is operated entirely by the Africans themselves and they sell to the Tanganyika Coffee Growers' Association direct after collecting it. The District Commissioner gives a little assistance but not unless called upon to do so.

Production of mild coffee for the last seven years in the Usambaras in tons was as follows :—

| | Native | Non-native |
|---|---|---|
| 1942 ... ... ... ... ... | 20 | ... 150 |
| 1943 ... ... ... ... ... | 8 | ... 62 |
| 1944 ... ... ... ... ... | 17 | ... 116 |
| 1945 ... ... ... ... ... | 40 | ... 110 |
| 1946 ... ... ... ... ... | 32 | ... 43 |
| 1947 ... ... ... ... ... | 36 | ... 136 |
| 1948 ... ... ... ... ... | 81 | ... 46 |

Ten tons of Robusta was produced in Korogwe and Handeni in 1948.

*Roll Tobacco.*—The tobacco crop is valuable in that it constitutes probably one of the best economic crops in cash return in the Western Usambaras. The bulk of it is produced in the Sub-chiefdom of Mtae. This year the crop was down, being only a little more than half of the 1947 crop. This is due to rather too much rain at harvesting time and also the tobacco planters, having had two bumper seasons, had enough money and therefore restricted their plantings. The crop amounted to sixty-nine tons of which seventeen tons have already been sold and fifty-two tons is being disposed of in January in a market set up at Mtae. The value of the crop this year to the native grower is approximately £3,500.

Exports from the Usambaras since 1937 have been as follows :—

| | | | |
|---|---|---|---|
| 1937 ... | 33 tons | 1943 ... | 43 tons |
| 1938 ... | 41 ,, | 1944 ... | 122 ,, |
| 1939 ... | 40 ,, | 1945 ... | 75 ,, |
| 1940 ... | 43 ,, | 1946 ... | 137 ,, |
| 1941 ... | 40 ,, | 1947 ... | 110 ,, |
| 1942 ... | 35 ,, | 1948 ... | 69 ,, |

*Wheat.*—Some wheat is planted in the extreme western tip of the Western Usambara block and this declined slightly this year in that area, but has extended somewhat into new areas. This extension is being fostered as much as possible at altitudes above 5,000 feet where maize is not at its best. There were over 800 growers each producing a few bags for seed and food. The varieties grown are Kenya Governor below 5,000 feet and Sabanero, a red wheat, above 5,000 feet. These varieties have both been free of all forms of rust during the last two years, both years being somewhat on the wet side.

*Beeswax and Honey.*—These commodities are produced in small quantities throughout the Province but Handeni District is the most suitable place. The Senior Agricultural Assistant, who was stationed here throughout the year, fostered the installation of a great number of bark hives of two compartments with a hole of exact size bored in the partition which acts as queen excluder. He persuaded a great number of people to install these hives and has raised the production of honey and beeswax quite considerably. The known sales amounted to five a half tons of beeswax and eighteen tons of honey but it is estimated that more honey was sold to natives of the Usambaras where honey forms a substantial part of bride price and there has always been a good trade in honey between the people of Handeni and those of the Usambaras.

*Vegetables.*—Production in the Usambaras increased and the season for vegetables was an excellent one. Apart from onion seed, the Department imported vegetable seed to the value of just under £100, which was resold to Africans. The bulk of the vegetables are marketed in Tanga but difficulty is experienced in distribution at the other end. A number of Africans have private customers of their own in Tanga and take parcels of vegetables down themselves and deliver them personally to their customers charging the rail fare of both themselves and their produce. A certain quantity of European produced vegetables goes to Dar es Salaam but there again it is distribution that is the limiting factor. The Usambaras could produce a great deal more in the way of vegetables if only these could be readily sold to distributors who would pay adequate prices. A further difficulty is, of course, the journey to Dar es Salaam which involves transhipment at Lushoto, Mombo, Korogwe and Morogoro. The production for the last four years was as follows:—

| | | | |
|---|---|---|---|
| 1945 | ... | 625 tons | (all supplied to Military). |
| 1946 | ... | 390 ,, | (sales to general public). |
| 1947 | ... | 361 ,, | ( ,, ,, ,, ,, ). |
| 1948 | ... | 512 ,, | ( ,, ,, ,, ,, ). |

*Onions.*—Production in the Usambaras for sale amounted to 120 tons as against seventeen tons in 1947. The sales are made direct to Tanga and Korogwe and are transported as head loads and by private lorry owners who buy direct and then sell in Tanga. The crop is growing in popularity.

*Betel Nuts.*—This is a popular crop in the Pangani river area. The nuts are of poor quality but are in high demand in Mombasa and Dar es Salaam because of the small imports from India and the high import duty. Further plantings are being made up the Pangani river, the only commercial betel nut area. Exports from the Tanga Province since 1942 were as follows:—

| | | | | | |
|---|---|---|---|---|---|
| 1942 | ... | 990 cwt. | 1946 | ... | 1,082 cwt. |
| 1943 | ... | 696 ,, | 1947 | ... | 1,311 .. |
| 1944 | ... | 1,856 ,, | 1948 | ... | 1,001 .. |
| 1945 | ... | 815 ,, | | | |

*Sisal.*—Fibre production during the last seven years was as follows:—

| | | | | | |
|---|---|---|---|---|---|
| 1942 | ... | 53,762 tons | 1946 | ... | 54,727 tons |
| 1943 | ... | 55,532 ,, | 1947 | ... | 54,780 .. |
| 1944 | ... | 59,693 ,, | 1948 | ... | 62,060 .. |
| 1945 | ... | 59,285 ,, | | | |

The acreage under sisal in the Province is now around 185,000 and the production comprises over 50 per cent of the total production of the Territory. The season was a good one—the rainfall being well spread. About August

the sisal weevil population rose very rapidly and one of the worst infestations on record was experienced. Along the coast-line infestation was particularly bad and extended as far inland as Ngomeni. A great number of estates had to commence hand collection and baiting with old sisal boles cut in half and turned face downwards to attract the weevil, so that they could be easily collected on the under sides of the boles in the early mornings. Sisal banding disease continues in several areas and it has been shown by Dr. Black of the East African Agricultural Research Organization that the disease can be cleared up by applications of muriate or sulphate of potash. The labour position has been better than at any time since 1946 due mainly to the very efficiently organized Labour Bureau of the Sisal Growers' Association.

*Tea.*—The production of made tea was somewhat lower than it has been for some considerable time due to the last flush being rather late so that a fair amount of the plucking which should have been done at the latter end of 1948 is actually being done in the first month of 1949. The season was not an unfavourable one. Production for the last thirteen years was as follows:—

| | lb. | | lb. |
|---|---|---|---|
| 1936 ... | 98,925 | 1943 ... | 470,452 |
| 1937 ... | 115,716 | 1944 ... | 411,000 |
| 1938 ... | 240,020 | 1945 ... | 398,000 |
| 1939 ... | 309,120 | 1946 ... | 339,192 |
| 1940 ... | 324,602 | 1947 ... | 341,029 |
| 1941 ... | 337,337 | 1948 ... | 323,260 |
| 1942 ... | 568,202 | | |

There is considerable development taking place in the Eastern Usambaras where a large factory is under consideration on one estate and further planting is taking place. A second estate is also under development in the Eastern Usambaras but is being considerably hampered by lack of tea seed of which there is a shortage throughout East Africa owing to difficulties of importation from India. The actual area under tea in the Province at the present time is 1,604 acres on three estates in the Western Usambaras and two estates in the Eastern Usambaras. There are two further estates in the Western Usambaras suitable for tea that are considering developing. In the Eastern Usambaras little development can take place over and above that already planned owing to labour difficulties which are bound to arise as over fifty per cent of the Territory's sisal estates, all employing labour, are located practically surrounding the Eastern Usambaras.

*Papain.*—Restriction of planting was lifted early in the year and at that time 1,250 acres of pawpaw had been planted in the Province. Production had not really commenced when the price fell and at the present time papain is hardly marketable. The result of this is that the bulk of people have uprooted their pawpaw and unless a change takes place for the better in price, there seems little likelihood that there will be any further activity in papain production.

*Cinchona Bark.*—There were slight increases in planting and the existing number of trees is put at some 5,000,000. There are, altogether, on the Eastern side of the Western Usambaras and in the Eastern Usambaras, thirteen estates with cinchona planted. The production over the last five years was as follows:—

| | | | |
|---|---|---|---|
| 1944 ... | 60 tons | 1947 ... | 49 tons |
| 1945 ... | 71 ,, | 1948 ... | 68 ,, |
| 1946 ... | 92 ,, | | |

*Kapok.*—Returns from planters show a total production of eighty tons during the year which is a slight rise over last year's figure of sixty-two tons. A certain amount of dieback has been occurring on some of the estates particularly in a Java variety which is rather a smaller tree than the more generally planted giant variety. The giant variety is only slightly affected by dieback. The condition is scheduled to be studied by the Plant Pathologist and the Entomologist, but there is little likelihood that the condition is due either to insect pest or disease and it is thought to be due rather to unsuitability of location of plantations or water logging. The condition is fairly general in Korogwe and the Western areas of the Tanga District.

*Derris.*—This crop is still on the decline. The production for the year was nine tons and there are only three estates producing.

*Essential Oil.*—Bitter orange oil production was 7·32 tons.

*Condiments.*—2·4 tons of black pepper and 5·5 tons of chillies were produced during the year.

*Palm Oil.*—27·2 tons of palm oil was produced in 1948. The total area under oil palm is 291·75 Ha.

*Cacao.*—Production amounted to three tons.

*Kweme Nuts.*—Production was four tons for sale and another six tons for local consumption in the Usambaras.

*Tung Oil.*—The acreage is around 200 from which four and a half tons of oil was produced.

*Castor Seed.*—twenty-six tons was sold in Handeni District.

*Sugar.*—There is a small factory on the Pangani river, rather dilapidated, which has changed hands many times. Figures from the present owner are jaggery sold in Tanga and Mombasa twenty-eight tons, worth Shs. 17,544/-. His cane fields are tending to decrease in acreage and they receive little cultivation. The natives in the vicinity plant a good deal of cane but prefer to sell it to sisal workers and so obtain a better price than they could at the factory. In the Usambaras there is a very large acreage of cane as the cane itself is one of the staple foods of the Wasambaa. It is used without any preparation.

### Pests, Diseases and Vermin

*Insect Pests.*—The most important pest which has increased rapidly this year in the Province is the sisal weevil (Scyphophorus acupunctatus Cyll). The increase commenced in August and on the sisal station itself the infestation became so great that it was impossible to get 100 per cent stands in experiments that were being planted. Along the coastal belt one estate that was examined had a 30 per cent loss in a new planting of some 500 acres. Estates were advised to engage in hand collection and to put old sisal boles, split in half, with the cut sides downwards, in the rows to attract the beetles so that they could be easily collected in the mornings on the undersides. At the time of writing the incidence has decreased a little. The Tanganyika Sisal Growers' Association are investigating a type of carabid from Yucatan which might act as predators, and are financing arrangements through the Department for Plaesius and Leionota to come from other sources as well, and, consignments have begun to arrive from the West Indies and are being liberated under

the supervision of the Entomologist or as he directs, on the Sisal Station and on estates in the vicinity.

*Coconut Beetle.*—The great incidence of these continues along the coast and much activity has been necessary in an attempt to clean up the coconut plantations. Small progress can be recorded.

*Banana Weevil (Cosmopolites sordidus).*—Small incidence is reported from the Moshi border and a clean-up was instituted in the North Pares.

*Stalk Borer.*—In maize, this pest was fairly prevalent but was not so great as in 1947.

*Locusts.*—The province was free of locusts throughout the year.

*Diseases.*—Irish Blight (Phytophthora infestans). In potatoes this was more severe than ever before in the Usambaras owing to the appearance of a new strain, which has since been classified at Corstorphine as a new strain E, which is apparently at present known only from the Usambaras in Tanganyika. This strain wiped out all the varieties of potatoes which had previously been tested and believed to be blight resistant. Early blight (Alternaria Solani) was present in all potatoes but it did no damage. Other diseases in potatoes were leaf roll and hollow heart. Armillaria was found in Jacaranda trees in Lushoto and a certain amount was also cut out on one tea estate. Vegetables kept fairly free of diseases in the Usambaras.

*Vermin.*—Pigs were fairly numerous in Handeni and in the coastal districts and a number of drives was organized by instructors. A poison gang operates in the Usambaras and although this method of vermin destruction is rather expensive the work carried out was fairly effective. Vermin control was considerably assisted by the arrival, late in the year, of a consignment of arsenious oxide which had been unobtainable for some time.

## Marketing

A good deal of progress was made in the marketing of crops in the Handeni District. A small start was made in 1947 and further extended in 1948, until eighteen markets had been established in the District. The results are past all expectation for some 7,000 tons of maize passed through the markets as well as quantities of a variety of other products. The marketing system in the Handeni District has, it is hoped, now come to stay, and it will be improved and perfected as time goes on.

The markets, started in the Pare District in 1947, continued to give excellent results and all rice that was available for sale was obtained. In the Korogwe area a modified form of marketing has been used, but a proper system is to be introduced in 1949. There is room for markets still in other parts of the Province, but this will have to be proceeded with very cautiously owing to the great number of sisal and other estates scattered about the Province, whose normal method of purchasing food should not be disturbed if it can possibly be avoided.

## Soil Conservation

A great deal of progress was made in the Pare District in the demarcation of contour lines on which contour banks can be built by the native cultivators. The construction of the banks goes very much slower than the demarcation of the lines and pressure has to be brought to bear upon the Africans to construct banks. There were 338 prosecutions in 1948 for not constructing banks.

However, the idea is catching on and progress can be recorded. A soil conservation gang of instructors is at work continuously in the Pare District. In the Usambaras a soil conservation gang of instructors continues to work and demarcate contour lines for live hedges or contour banks and a little progress has been made. This work will have to be commenced in the Handeni District and in Muhesa as well, but in those areas work has been concentrated in 1948 on greater production of food and, having achieved that object, soil conservation work will be begun.

### Mlalo Rehabilitation Scheme

The Mlalo Basin is situated at the north-western side of the Western Usambara mountain mass in what may be termed the driest part of the Usambaras. It is some sixty square miles in extent. It is stated to be overcrowded and is suffering from deterioration of the soil from various causes. The scheme is to rehabilitate this basin by :—

(a) Studying the habits and customs of the people by means of a village survey and at the same time collecting vital statistics and, from the data collected, to formulate a long-term policy for the future.

(b) Demonstrating and testing methods, in a defined area, of land utilization and improved village life.

The Scheme commenced in 1946 and after a year when staff had been collected it was finally got under way in 1947 and has since made a certain amount of progress. Political troubles have been common and organized opposition to the whole Scheme was rife in 1947 but during 1948 rapid progress has been made with very firm backing from the Administration.

The village survey consists partly of the collection of vital statistics and a census, and the former was carried out for one calendar year, namely 1948, and was completed. A 10 per cent sample family survey continues to progress and covers the same area as the census and vital statistics survey. It details aspects of the sample family's life. The samples are chosen by randomized method in each village and consist of :—

(a) At least one land holder and his family from each village.

(b) From villages with a population of more than ten land holders 10 per cent of the land holding families are chosen.

The information is collected by a team of African "surveyors" who have passed Standard X at school and who obtain the information required in the local Kisambaa language but record the answers in English on a series of forms which cover the following :—

(i) Constitution of the family and age, sex, clan, tribe and religion of its members.

(ii) Medical data. (Other medical data is also collected from out-patients register of Mwangoi dispensary).

(iii) Housing, sanitation and water supplies.

(iv) Movements.

(v) Income and expenditure.

(vi) Food grown on their own holdings.

(vii) Land tenure, utilization and agriculture.

(viii) Livestock.

(ix) Education, marketing and labour employed by the sample family.

The medical and veterinary side of the Survey are carried out by African officers seconded from those departments. In addition officers of the Medical Department are carrying out nutrition and malaria surveys. The Survey is nearing completion and it is hoped that all the figures will be ready for statistical analysis in mid-1949.

The Demonstration Area comprises a chosen area consisting of the smallest recognized administrative unit, namely, a "mtaa" (headman's area). In this chosen area the population is sixty adult male and ninety-eight adult female and 196 children, giving a total of 363. There are 150 head of cattle, thirty sheep and 105 goats. The area is 658 acres in extent. The planned sheep and 105. goats. The area is 658 acres in extent. The planned utilization which is being carried out with paid labour entirely, is forest—119 acres; cropping land—500 acres; fodder crops—twenty-three acres, and pasture—eight acres. The land utilization is determined by the slope and the nature of the soil. The following three main types of cultivation have been introduced :—

(a) The lower slopes have ridge cultivation with vegetative material in large quantity buried in the ridges once in a rotation of four or five years.

(b) The medium slopes have terraces and the width of these is determined by the thickness of the top soil layer, so that no sub-soil is brought to the surface and all digging may be down the slope. Grass protection of terrace fronts must be used.

(c) The steepest slopes have ridges at narrow intervals, also with quantities of vegetative material buried in them, but these will evolve into bench terraces by the continuous building up of the area behind the ridge with weeds and plant residues until terraces are formed.

Slopes above 25° are taken out of cultivation altogether and are either planted with forest trees for fuel or bananas. In addition to these measures on cultivated land all abandoned land which has already become too unfruitful from erosion has been brought back into cultivation using the ridge with a large core of vegetative material buried within it to rot and so improve the soil of the ridge itself. Cattle have been excluded from the hillsides and are confined to the flat areas at the bottom of the valleys. The fringes of these valleys are planted with elephant grass. housing for cattle has been constructed and all cattle are stall-fed. Domestic water supplies have been arranged to that all the small villages are served by furrows and the drinking places for cattle and humans have been separated and precautions taken to ensure their cleanliness. The Survey so far reveals that apart from malaria, hookworm and roundworm are the most prevalent of the ailments from which the people suffer and consequently latrines of proper depth and well situated are in integral part of the layout of the demonstration area.

It is impossible at this stage to make any recommendations for the future. Nevertheless, it is apparent from the figures so far collected (but not yet analyzed) that the belief that the country is overcrowded is justified, for

preliminary figures show that the Mlalo Basin has a total population of 20,087, including absentees, and the percentage of absentee males, mostly at work outside the area, is 17·40 per cent. In one mtaa, a fairly large one, the average family holding is 5·01 acres, split up into 10·41 fields with an average acreage of 0·48 acres each, and the slopes of these fields vary from 0°-35°. These figures appear to be fairly indicative of the whole area.

### Luengera and Kitivo Irrigation Schemes

*The Kitivo Scheme.*—This region was surveyed and it was found that there are two areas which can grow rice comprising a total of approximately 1,600 acres of which 1,000 acres is sparsely occupied by Africans. There is room for many more people without the provision of any irrigation scheme, owing to the rise of level of the water during the wet season. The simple construction of rice bunds is sufficient provision for the cultivator at present. The area can be extended as the people in the mountains come down to cultivate rice. The second area must have a furrow, but the people in that part have commenced to construct this for themselves with advice from this Department, and there is no necessity for any money to be spent in assisting them.

*Luengera Scheme.*—A Survey of this area was completed and a small pilot furrow carrying two cusecs of water is now working. It is hoped to get 100 acres bunded and planted as labour permits during the coming rains in 1949 when some idea can be obtained as to what area of land the available twenty-five cusecs of water will irrigate if the furrow is enlarged.

All these irrigation areas for rice are being provided to relieve the population pressure in the Usambara Mountains, but the people are most unwilling to leave the healthy mountains and cultivate the rather unhealthy plains. However, economic necessity will force them to do so in time.

### Tanga, Lushoto and Pare Production Committee

Two meetings of the Committee were held during the year, and advice was tendered to the Director of Agriculture on a variety of matters. The Committee dealt with claims for acreage bonus for 7,624 acres of maize and recommended payments amounting to £12,198/8/-.

### Seed Farms

The Native Authority Seed Farm at Handeni was maintained and multiplication of sorghum and other suitable crop seeds was carried out.

The Department's farm at Lushoto continued with potato work and a separate report on the activities there is attached.

The Department of Agriculture acknowledges the co-operation of all Departments in the Tanga Province in assisting in its work, and particularly that of the Provincial and District Administrations.

C. J. McGregor,
*Provincial Agricultural Officer,*
*Tanga Province*

## Kungului Farm, Lushoto

*Annexure* I.

1. The farm consists of nineteen acres just outside the Lushoto Township boundary. It is mainly used for testing potato varieties, resistant to Irish Blight (Phytophthora infestans), bred at Corstorphine, Scotland, for such resistance. In 1947 an irrigation furrow was constructed and the potato work can thus be carried on out of season when necessary.

II. *Development.*

2. About an acre of terracing was carried out during the year. An isolated plot in the forest reserve was cleared and fenced some distance away from the main plantings and also away from all native plantings to avoid the condition arising from infection by the leaf roll virus which appeared in the main plantings early in the year.

III. *Potato Diseases.*

3. *Phytophthora infestans (Irish Blight).*—Testing of varieties for resistance to this disease continued. Up to the middle of 1948 it was considered from the behaviour of the various varieties imported from Corstorphine of known susceptibility and resistance to the different strains of P. infestans that a strain not A, B nor C was present and some varieties were resistant to it, notably the majority of varieties imported in 1947 and 1948. Indeed in 1947 only one imported variety went down to P. infestans. In 1948 August plantings, and later in September and October plantings, all varieties, including those that had been free of P. infestans since first imported in 1945, went down to P. infestans, and it was obvious that yet another Blight strain had appeared. Specimens were sent to Corstorphine and this proved to be the case. The strain has been named "E" and so far it is apparently located in the Usambaras only.

4. *Xanthomonas solanacearum (Brown rot).*—The farm remained free of this disease throughout 1948 so that the precaution of burning piles of bush-wood in the areas where the disease was found in 1947 has apparently been successful.

5. *Alternaria (Early Blight).*—This appeared in all varieties but no damage occurred. The disease appears only when maturity has been reached.

6. *Hollow Heart.*—This was found in a few tubers but no serious damage occurred.

7. *Tuber rots.*—These occurred in a few tubers: some were *Fusarium* spp. but no *F. coeruleum* was found. A few tubers after delivery in Tanga for store developed Black Heart caused by storing at too high a temperature.

IV. *Insect Pests.*

8. There were no outbreaks of insect pests other than a little eelworm found in a few tubers and cutworm in the field.

V. *Potato Observation and Multiplication.*

9. The following varieties were planted with results as shown :—

| *Variety* | *Remarks* |
|---|---|
| 1082a(2) ... | Received from Corstorphine in 1947 when planted twice—one in 1947 and one in 1948 with fair results. It remained free of Phytophthora infestans but succumbed on being planted a third time in 1948. |
| 1271b(9) ... | Received from Corstorphine in 1947 and planted twice—one in 1947 and one in 1948 with fair results. It remained free of Phytophthora infestans but succumbed on being planted third time in 1948. |
| 1092a(4) ... | ditto. |
| 1085 (6) ... | ditto. |
| 914a(12) ... | ditto. |
| 914a(91) ... | The original importation of this was made from Kenya and later importations arrived from Corstorphine. It has been under multiplication and trial since 1945. The total quantity of seed obtained for issue by 1948 was 15,360lb. and this was distributed to two planters for multiplication. Unfortunately, the new strain "E" of Phytophthora infestans attacked these and the crops had to be sold as ware. Before succumbing to Phytophthora infestans this was the heaviest yielding and most hardy variety imported. |
| 914b(52) ... | This was originally imported from Corstorphine in 1946 and after 914a(91) was the most promising variety. After multiplying to 1,319lb. of seed it succumbed to Phytophthora infestans strain "E". |
| 833b(98) ... | This variety also came from Corstorphine in 1946 and was multiplied up to 3,359lb. of seed. This is the best eating potato of all the varieties. The last planting in 1948 went down to Phytophthora infestans, probably strain "E" like the others. |
| 835a(4) ... | Similar to 833b(98) and multiplied up to 980lb. of seed but the 1948 planting succumbed as 835b(98) did. |
| 653d(22) ... | ditto. |
| 1434a(8) ... | This arrived from Corstorphine in 1948 and was planted in April. It succumbed to P. Infestans, probably strain "E" like the others. |
| 1256b(13) ... | ditto. |
| 1318 (3) ... | ditto. |
| 1433b(14) ... | ditto. |
| 1081a(9) ... | ditto. |
| 1315b(10) ... | In spite of infestation of P. infestans this variety cropped quite well. |
| 834c(4) ... | In spite of infestation of P. infestans this variety cropped quite well. Only a few spots of P. infestans appeared and the variety apparently has some resistance. |
| 834b(6) ... | ditto. |
| 877a(34) ... | This variety is a filter for the "C" strain of P. infestans. |

It has been planted several times in 1947 and 1948 and has never shown any sign of P. infestans. It is not a suitable commercial variety being a tester only.

VI. *Minor Crops.*

10. A number of new varieties of peas, cauliflower, celery, lettuce, squash and beans were imported for the first time and tested for suitability to the Usambaras before seed of these varieties were sold to Africans.

11. Planting material of minor crops was maintained as follows :—

Lavender, black peppermint, white peppermint, edible Canna, Paspalum virgatum, Pennisetum Solefex and three strains of Pennisetum purpureum. Two varieties of mosaic resistant Burley tobacco seed was planted for acclimatisation and multiplication.

VII. *Miscellaneous.*

12. The potato work benefited by a visit from Dr. Black, Plant Breeder, from Corstorphine, who advised on the varieties of potatoes he had bred for trial and generally on potato work. Dr. Wallace, Plant Pathologist, has been ever ready with assistance in the potato work and visited the plots many times during the course of the year.

C. J. McGregor,
*Provincial Agricultural Officer,*
*Tanga Province*

## Climatic Conditions

Rainfall during 1948 was up to the average in Southern Province since records have been kept. The rainfall was not equal to that recorded in 1947 when the Southern Province experienced the best harvests on record but was sufficient to obtain good harvests. The exception was the Kilwa District where an unusually long dry period occurred during the months of January, February and March, and crops, particularly paddy, suffered in consequence.

| | Inches | Days |
|---|---|---|
| Lindi ... ... | 35·68 ... | 97 |
| Mahiwa ... ... | 31·02 ... | 62 |
| Masasi ... ... | 32·36 ... | 70 |
| Kilwa ... ... | 27·18 ... | 91 |
| Mikindani ... ... | 31·62 ... | 80 |
| Tunduru ... ... | 45·55 ... | 90 |
| Songea ... ... | 49·21 ... | 101 |

## Food Crops and Food Supplies

No record of the 1948 crop year is complete without referring first to the 1947 season, since many of the ills that beset cultivators in 1948 arose out of the bumper crops of 1947. Harvests reaped in 1947 were the best within living memory and as marketing facilities were unable to cope with the vast quantities involved, cultivators were left with much of the produce on their hands. Gunnies were inadequate, lorries were too few to transport the crops from market to port while lack of shipping held up the shipment of surplus crops. With so much left on their hands it is hardly surprising that the African cultivators did not bestir themselves to plant maximum areas for the 1948 season, but the greatest fault of all was that most of the grain was planted late and immediately fell a prey to the rodents that had multiplied enormously because of the plentiful food supplies left in the fields on account of careless harvesting. The earliest planted crops escaped damage and gave good yields; late-planted seed on the other hand was dug up by the rodents as fast as it was planted and although replanting was done this sequence was kept up until it was too late to plant any more. In areas where this happened next to no grain was reaped and the inhabitants of these areas have had to subsist largely on cassava. Fortunately, rodents were not numerous everywhere and certain areas reaped very good crops of sorghum.

## Crop Production

*Sorghum (mtama).*—The remarks above apply particularly to the sorghum crop of 1948. Where planted at the very beginning of the rains, good crops were harvested but where the original planting was delayed the sequence of replanting—plus rat damage—went on until it was too late to plant any more. The quantity of sorghum available for marketing was, therefore, comparatively small; even then it would have sufficed for local requirements had adequate storage been available to cope with the balance remaining from the 1947 harvest. Adequate storage just could not be had and rather than allow this grain to be completely ruined by unsatisfactory storage, permission was reluctantly given to export it. In all some 1,378 tons of sorghum were exported and it has been necessary to start importing at the end of the year to cope with the greatly increased demands of fed labour employed by the Overseas Food Corporation, Railway Contractors, and so forth.

One of the most suitable varieties of sorghum for the coastal belt of Southern Province is undoubtedly Msumbiji. This is a long-term sorghum having a very hard grain which is not readily attacked by insect pests even in the hot and humid conditions obtaining in the coastal belt; even after one year's storage under such conditions the grain is still in reasonably good condition. The "soft-grained" sorghums on the other other hand do not keep well in storage and the losses under such conditions are high. At present, losses in storage are great since traders will not take the trouble to keep hard-grained and soft-grained sorghum separate, but should the Economic Control Board (or its agent) eventually purchase and store grain in this Province storage losses could be considerably reduced by using soft-grained varieties for immediate consumption and concentrating on hard-grained sorghum for storage.

Sales in the Produce Markets were :—

| | Grain tons | Flour tons |
|---|---|---|
| Kilwa ... ... | 719 | ... — |
| Lindi ... ... | 1,342 | ... 10 |
| Mikindani ... ... | 395 | ... — |
| Newala ... ... | 474 | ... — |
| Masasi ... ... | 154 | ... — |
| Tunduru ... ... | 1 | ... 6 |
| | 3,085 | ... 16 |

*Maize.*—Maize has always played a minor (though important) part in the agriculture and economy of Southern Province and any attempt to reverse this relative importance should be strongly resisted. Sorghum is far more suitable as the staple cereal in all but the higher-lying parts of Songea and Tunduru Districts. Maize is planted three times per annum (i) at the very outset of the rains in November (ii) with the main rains in March and (iii) as valley bottom plantings during the dry season. Each of these plantings produces a crop at a time when food supplies of cultivators are often at a low level. The early maize sown in November, 1947, produced a useful crop, most of which was consumed by the growers; the March plantings on the other hand were largely destroyed by rats and consequently far greater areas were planted in river beds and valley bottoms during the dry season. This dry season crop has been extremely useful this year in tiding growers over a period of scarcity of grain.

Since the 1947 harvests were so good it was natural that growers should wish to dispose of some of their surplus maize, and some 300 tons of Tunduru maize were sent to Lindi in the hope of finding a market. None was forth-coming and after it had deteriorated in unsatisfactory storage for several months permission had to be given to export it. Surplus maize can easily be used for fed labour locally provided it is not stored too long but untreated maize just will not keep for any length of time in the hot humid climate of Lindi.

Exports of maize therefore consisted only of maize that had to be exported to avoid further deterioration in storage. None of the dry-season crop will be available for export. Sales in the Produce Markets were :—

| | Maize grain | Maize flour |
|---|---|---|
| | tons | tons |
| Kilwa ... ... | 21 | — |
| Lindi ... ... | 168 | 2 |
| Mikindani ... ... | 109 | — |
| Newala ... ... | 735 | — |
| Masasi ... ... | 166 | — |
| Tunduru ... ... | 17 | 103 |
| Songea ... ... | — | 130 |
| | 1,216 | 235 |

*Paddy and Rice.*—The rains of 1948 in no way compared with the copious and well-distributed rains of 1947 and consequently the paddy crop was only fair. If cultivators could be persuaded to make greater use of available water supplies by constructing any form of bunds or contour banks far better rice crops could be obtained and the cultivator could reap a good rice crop every year instead of every second year as at present. In the Southern Province the crop is grown entirely on the flat and since seed is not sown in nurseries and transplanted later much of the crop is planted too late.

One factor which retards the progress of the rice crop in Southern Province is that of selling the bulk of the crop as hand-hulled rice. This is a very inferior produce compared to the machine-milled article but its greatest fault is that although unhulled paddy stores extremely well even in the coastal belt, hand-hulled rice with its numerous broken grains quickly deteriorates in storage. It is true that there is a big damand for this inferior hand-hulled rice at present but should export from the Province be seriously contemplated the crop will have to be marketed as paddy, stored as paddy, and only machine-milled as it is required by the consumer.

Three main types of rice are grown :—

(i) Sifara—synonymous with Faya and Afaa.

(ii) Bungala, a soft-grained starchy type which withstands periodic drought periods better than the Faya types, and is therefore a more consistent yielder.

(iii) Ngwindimba, a "hill" rice grown on the sandy soils well away from valley bottoms. This has a red "testa" or seed coat and the average sample of hand-hulled Ngwindimba presents a most unattractive appearance.

Exports of rice by sea totalled only forty-seven tons but a quantity moved by road did not come under control after the removal of road barriers. The long coastline of Southern Province also facilitates the export of rice by dhow to Zanzibar where even the lowest grades fetch a ready sale. Sales in the Produce Markets were :—

| | Paddy | Hand-hulled Rice |
|---|---|---|
| | tons | tons |
| Kilwa ... ... | 57 | 381 |
| Lindi ... ... | 16 | 59 |
| Mikindani ... ... | 126 | 65 |
| Newala ... ... | — | 397 |
| Masasi ... ... | — | 61 |
| Tunduru ... ... | — | 307 |
| Songea ... ... | — | 129 |
| | 199 | 1,399 |

Facilities for machine-milling of paddy are still inadequate but permission has already been given to Messrs. Jiwan Jeraj, Lindi, to install rice milling

machinery at their grain mill at Mtama and it is hoped that this machinery will be installed before the 1949 crop is harvested.

*Cassava.*—1948 will long be remembered as the year in which such vast quantities of cassava root were exported, much of it being the crop harvested during 1947. In all some 14,052 (metric) tons were exported during 1948 while considerable balances still remain in the peasants hands. Cassava is particularly suited to the light sandy soils typified by the Makonde plateau area and it is worth noting that in Newala District alone 12,217 tons of cassava root were sold in the Produce Markets in 1948; in other words the Makonde plateau alone would have supplied the entire export of cassava from Southern Province. Other than in the light sandy soils cassava is not so popular a crop as is sometimes thought, while in the Kilwa District, with the exception of a few areas, there is far too little cassava. This is partly accounted for by damage caused by wild pig but quite apart from this, cultivators are still reluctant to plant the crop although they have been perfectly prepared to eat cassava imported by Government in times of food shortage, in the past.

Sales in the Produce Markets were :—

| | Cassava Root tons | Cassave Flour tons |
|---|---|---|
| Kilwa ... ... | — | — |
| Lindi ... ... | 1,190 | 832 |
| Mikindani ... ... | 3,036 | — |
| Newala ... ... | 12,217 | 45 |
| Masasi ... ... | 927 | 187 |
| Tunduru ... ... | — | — |
| Songea ... ... | — | 185 |
| | 17,370 | 1,249 |

In Tunduru traders could not purchase cassava since all the cassava required for export could be obtained much nearer the coast ports (Newala and Mikindani).

Exports of cassava from the Southern Province in the past few years have been :—

| | Tons |
|---|---|
| 1943 ... | 4,144 |
| 1944 ... | 7,957 |
| 1945 ... | 261 |
| 1946 ... | 1,870 |
| 1947 ... | 2,244 |
| 1948 ... | 14,052 |

*Sesame.*—The medium rainfall of 1948 suited the crop better than the heavy rainfall of 1947 but planting was not as extensive as it might have been on account of the upset caused by the rat outbreak. Much of the crop is intersown in sorghum when the first weeding of the sorghum is done in January, but as the sorghum crop had to be replanted several times the intersowing of sesame often went by the board. In spite of this the more favourable conditions of 1948 resulted in a crop not far below that of 1947. Purchases in the Produce Markets were :—

| | Tons |
|---|---|
| Kilwa ... ... | 792 |
| Lindi ... ... | 2,144 |
| Mikindani ... ... | 186 |
| Newala ... ... | 127 |
| Masasi ... ... | 407 |
| Tunduru ... ... | 81 |
| Songea ... ... | 79 |
| | 3,816 |

Exports from the Province in the past few years are :—

| *Sesame :* | | Tons |
|---|---|---|
| 1943 | ... | 5,162 |
| 1944 | ... | 2,654 |
| 1945 | ... | 3,223 |
| 1946 | ... | 2,976 |
| 1947 | ... | 3,344 |
| 1948 | ... | 3,209 |

*Groundnuts.*—Groundnuts are an important cash crop in Masasi and Tunduru Districts. Elsewhere, in most districts, the crop is grown primarily for home consumption, any surplus being sold in the markets. In Kilwa, the crop has never caught on since many of the soils are too heavy for its successful cultivation and its place is largely taken by sesame.

Market intake at the Produce Markets was :—

| | | | Tons |
|---|---|---|---|
| Lindi | ... | ... | 69 |
| Kilwa | ... | ... | 1 |
| Mikindani | ... | ... | 7 |
| Newala | ... | ... | 64 |
| Masasi | ... | ... | 499 |
| Tunduru | ... | ... | 163 |
| Songea | ... | ... | 23 |
| | | | 826 |

*Cashew Nuts.*—The light, somewhat infertile soils occurring over much of the coastal belt of Southern Province are admirably suited to the production of cashew nuts and largely as a result of higher prices obtained during the past few years there has been a marked increase in planting of cashew trees although the full effect of these recent plantings will not be felt for some time. Cashew trees are very drought resistant, they are remarkably free from pests and diseases while the unhusked nuts can be stored for a considerable time in the humid climate of the coastal belt without suffering deterioration. The crop is essentially suited to the coastal belt since although the trees will grow in the higher altitude areas of Songea and Tunduru the yields obtained are not economic.

The small plant at Mikindani for the production of husked kernels was in operation for part of the year only. At present almost the entire crop goes to India for processing and grading and thence to U.S.A. where there is a big demand.

The exports from the Province for the past few years were :—

| | | Tons |
|---|---|---|
| 1943 | ... | 269 |
| 1944 | ... | 355 |
| 1945 | ... | 3,971 |
| 1946 | ... | 1,900 |
| 1947 | ... | 1,312 |
| 1948 | ... | 4,533 |

*Pulses.*—Only fair crops of pulses were secured, although these sufficed for all local requirements with a small amount available for export from the Province. Rats took their toll of newly-planted seed while cowpeas grown during the rains were badly attacked by a Flea-beetle (Ootheca benigseni) although the dry-season crop of cowpeas grown in valley bottoms escaped damage. Pigeon pea formed the bulk of the pulses sold in the Produce Markets and although the crop is fairly common in certain districts it could be grown more extensively than at present. Propaganda to intersow pigeon pea

in all cassava has been carried on throughout the year and there are indications that this crop mixture will be a popular one.

Sales in the Produce Markets were :—

| | Tons |
|---|---|
| Kilwa ... ... | 70 |
| Lindi ... ... | 675 |
| Mikindani ... ... | 103 |
| Newala ... ... | 150 |
| Masasi ... ... | 809 |
| Songea ... ... | 17 |
| | 1,824 |

*Sisal.*—No major difficulties were encountered by sisal estates during the year; minor shortages of materials, labour and foodstuffs did not affect production and shipping space has been easier to obtain than in 1947.

*Coconuts and Copra.*—With a rising standard of living more and still more coconuts are used for home consumption with the result that fewer nuts are available for manufacture into copra. Most of the copra is sun-dried and the resultant product is not of high quality; a few copra kilns were constructed some years ago but these are used only during the rains when sun-drying is no longer possible. Copra exports during the past few years have been :—

| | Tons |
|---|---|
| 1945 ... | 699 |
| 1946 ... | 635 |
| 1947 ... | 625 |
| 1948 ... | 888 |

Two plots of coconuts, one in Lindi District and one in Mikindani District are being crop recorded.

*Tobacco.*—The amount of leaf tobacco purchased from native growers in Songea in 1948 was 599·5 (metric) tons—the second largest crop ever produced in Songea District (Record crop=630 tons in 1943). Several factors contributed to this: (i) all tobacco-growing areas were toured by Mr. A. S. Stenhouse, Senior Agricultural Officer before planting time, and growers were informed that "overage" buying would cease and that the tobacco would be bought on a dead-weight basis (ii) favourable climatic conditions in 1948 and (iii) higher prices paid to the growers for leaf tobacco. Growers stated that they were well satisfied with the prices and returns obtained for the 1948 crop and announced their intention of growing still bigger acreages in 1949. There was a big demand for seed for the 1949 crop and it was only with difficulty that all demands for seed were met.

The urge to plant greater areas of tobacco often means that the African grower plants a greater area than he can look after properly, and correct methods of tending tobacco plants in the field and subsequent curing methods often leave much to be desired. De-suckering is often neglected thus nullifying the value of topping. Barns or sheds for curing the tobacco are seldom big enough to cope with the amount of leaf picked. Since "overage" buying has ceased there is no longer any deduction for excess moisture as in the past and growers were quick to realize that excess moisture could be added and, of course, sold as tobacco. This was done usually by exposing the leaf to dew overnight prior to marketing the tobacco the next morning. The remedy lies in promulgating rules for the growing and curing of tobacco and their rigid enforcement. This is receiving attention. After the resignation of Mr. C. Lockwood at the end of June, the Tobacco Board had no Field Officer at all.

Much attention was given to supervision of tobacco markets by the Agricultural Assistant, but since buying usually took place at two centres each day only half the markets could be visited by him.

The present factory for the drying and conditioning of cured leaf and the baling and despatch for export is totally inadequate for handling crops of the size of the 1948 one and since the original factory has been added to on several occasions the layout is now most inconvenient. A new factory will have to be provided but so far agreement has not been reached on a suitable design. The site of the new factory likewise has not definitely been decided.

The Songea District Native Tobacco Board met on two occasions during 1948. At the first meeting held in June it was decided to increase the prices paid to the grower. Prices paid per kilo in 1948 (with 1947 figures for comparison) were :—

| Grade | 1948 Payment Sh. Cts. | 1947 Payment Sh. Cts. |
|---|---|---|
| I | 1 30 | 1 00 |
| II | 90 | 70 |
| III | 50 | 35 |
| IV | 20 | 10 |

There was a serious hold-up in the export via Nyasaland of tobacco bales destined for the British market. At one time over 1,300 bales were lying at Mbamba-Bay on Lake Nyasa awaiting collection by Nyasaland Railways craft. Eventually the whole crop was exported before the roads closed at the end of the year. It was intended to make a trial shipment via Lindi, but this had to be cancelled at the last minute on account of petrol shortage. It must be admitted that the present facilities for handling tobacco at Lindi leave much to be desired and considerable improvement will be necessary before leaf tobacco can be exported via Lindi. Scrap tobacco which otherwise would be unmarketable was sold to a firm in Northern Ireland for the manufacture of Nicotine Extract. This scrap tobacco (thirty-two tons in all) was exported via Lindi.

The value of the tobacco crop to Songea District can be gauged from the following figures relating to the 1948 crop :—

*Tobacco purchased from growers:*

| Grade | Kilos | Tons |
|---|---|---|
| I | 267,634 | 263·42 |
| II | 189,408 | 186·42 |
| III | 103,585 | 101·96 |
| IV | 38,885 | 38·27 |
| Total purchased | 599,512 | 590·07 |
| Available for sale | 408,725 | 402·28 |

| | |
|---|---|
| Cash paid to growers | Shs. 577,960.90 |
| Average payment per 100 kilos | ,, 96.41 |
| Average payment per grower | ,, 50.26 |
| Average production per grower | 52 kilos. |
| Number of growers | 11,500 (approx.) |
| Value of other crops to growers | Shs. 366,772.87 |

Mr. W. Sibly-Warne, Senior Agricultural Assistant continued to be seconded as Manager to the Ngoni-Matengo Co-operative Marketing Union and was also Assistant Executive to the Tobacco Board until his departure on vacation leave at end October, 1948. These duties were then taken over by Mr. Stevens who arrived in Songea on first appointment in November, 1948.

*Coffee.*—The coffee crop in the Southern Province is confined almost exclusively to that produced in the Matengo division of Songea District. The higher-lying areas of Matengo are well suited to coffee culture but there is a tendency for coffee growing to spread to the lower altitude areas where conditions are too dry. All coffee is grown on the single-stem but in view of the lack of knowledge of pruning a plot of multiple-stem coffee could well be tried out. There is a great dearth of pulpers at present and arrangements have been made to purchase pulpers in time for dealing with the 1949 crop. The coffee is hulled by African growers themselves and is sold by them as clean coffee. The crop is handled by a Coffee Society affiliated to the Ngoni-Matengo Co-operative Marketing Union. Production in 1948 amounted to 52½ tons of clean coffee compared with 13½ tons in 1947.

*Wheat.*—Wheat is grown only in Songea District. Yields were not so heavy as in 1947 since the main rains ceased abruptly and much of the wheat was planted too late. The wheat is all "Kenya Governor". Total sales in Songea District were 420 tons, of which roughly 150 tons were sent to Iringa for milling, the remainder going to other districts of the Southern Province.

*Potatoes.*—European potatoes are grown in Songea and Tunduru Districts although exports to other districts of the Province come almost entirely from Tunduru. Production was increased in 1948 in order to meet possible increased demand as a result of the starting up of the Groundnut Scheme in the Southern Province but this demand did not materialise since the Overseas Food Corporation had to import potatoes from outside the Province during the rainy season (the Tunduru/Masasi road being impassable), and they continued to uphold their existing contracts after Tunduru potatoes were in free supply. They purchased some twenty tons in all and it was only with difficulty that the bulk of the Tunduru crop (235 tons sold in Produce Markets) could be disposed of. In 1949 contracts will be entered into with buyers before the opening of the harvest so that no such hold-up should occur again.

Since the Tunduru road is closed for several months every year an attempt has been made to grow potatoes on the Rondo plateau of Lindi District for supply during the main rains. Seed was obtained from Tunduru and planted on the Rondo plateau in December.

*Cotton.*—As prices of other crops increase, so interest in cotton growing in Southern Province has gradually decreased even although the price of cotton has also increased. The position now is that cotton growing is prohibited in Kilwa District and in that part of Lindi District north of the Lindi-Masasi road. It is also prohibited in Songea. These prohibitions are designed to prevent the spread of Red Bollworm (Diparopsis castanea) to the Eastern Province and Nyasaland respectively. In Tunduru cotton has increased slightly but the decrease in other districts is so great that cotton growing other than in Tunduru District can now practically be ignored. The following amounts of seed cotton were sold :—

| | A. Kilos | C. Kilos | Total Kilos |
|---|---|---|---|
| Tunduru ... ... ... | 52,608 | — | 52,608 |
| Masasi ... ... ... | 2,794 | 140 | 2,934 |
| Lindi ... ... ... | 6,524 | 380 | 6,904 |
| Mikindani ... ... ... | 17,862 | 3,023 | 20,885 |
| | | | 83,331 |

Production of lint was

| Ginnery | Ar. lb. | Br. lb. | Total lb. |
|---|---|---|---|
| Tunduru ... ... ... | 37,731 ... | — ... | 37,731 |
| Mtua ... ... ... | 6,429 ... | 388 ... | 6,817 |
| Mikindani ... ... ... | 12,380 ... | — ... | 12,380 |
| | | | 56,928 |

*Sunflower.*—The distribution of sunflower seed in 1948 was popular and since prices were good the whole of the 1948 crop has been in demand for planting in 1949. Unfortunately the rat outbreak was at its worst when the crop was planted in the coastal belt in 1948 and much of the seed was lost. Further inland where rat damage was less the crop harvested was good. In Songea, the crop has been grown for many years and is used by natives as an oil-seed for home consumption. Sales in Markets were :—

| | Tons |
|---|---|
| Songea ... ... | 77 |
| Tunduru ... ... | 5 |
| Mikindani ... ... | 25 |

## Exports

The following is a tabulated list of exports from the Southern Province during 1948 :—

| Product | Tons | Value : Shs. |
|---|---|---|
| Sisal and tow ... ... | 12,116·00 ... | 18,029,451·25 |
| Groundnuts ... ... | 454·27 ... | 153,726·55 |
| Sesame ... ... ... | 2,209·01 ... | 1,399,431·78 |
| Mtama ... ... ... | 1,377·94 ... | 290,712·01 |
| Maize ... ... ... | 306·81 ... | 60,001·41 |
| Pulses ... ... ... | 662·35 ... | 194,820·46 |
| Cashew Nuts ... ... | 4,533·30 ... | 1,426,488·14 |
| Beeswax ... ... ... | 163·96 ... | 938,297·98 |
| Tobacco ... ... ... | 156·72 ... | 117,778·70 |
| Cassava ... ... ... | 14,051·68 ... | 2,419,686·57 |
| Gum Copal ... ... | 65·54 ... | 56,966·00 |
| Mangrove Bark ... ... | 1,783·16 ... | 356,580·00 |
| Colombo Root ... ... | 25·39 ... | 18,664·08 |
| Native Starch ... ... | 18·95 ... | 8,710·00 |
| Copra ... ... ... | 888·12 ... | 413,445·41 |
| Other Grain ... ... | 10·25 ... | 6,108·00 |
| Millet ... ... ... | 119·35 ... | 29,902·00 |
| Rice ... ... ... | 47·03 ... | 13,559·10 |
| Castor Seed ... ... | 19·05 ... | 9,500·00 |
| | | 25,883,830·34 |

## Markets and Marketing

Produce markets controlled by the Native Authorities have been in operation for three years only—1946-47-48—and since their inception have been extremely popular with African producers. Several serious hitches occurred in 1948, the most serious of which was the shortage of gunny bags. Next in order of importance came the shortage of storage space; at the beginning of the marketing season existing stores were cluttered up with produce from the 1947 harvest and since this was not then required for local consumption permission was given, with some reluctance, to export surplus maize and sorghum from the 1947 crop. Had satisfactory storage been available this grain could have been stored for use during 1948. Shipping space was more easily obtainable in 1948 but even then the pile of cassava root stacked out in the open at the Customs in Lindi was so great that buying had to be stopped

until the accumulated stocks of 2,000 tons were exported. One grain mill with storage space of 400 tons was built at Mtama during the year while another was under construction at Nangoo. A Mainhill hangar with a capacity of 1,500 tons was sent to Lindi at the beginning of the marketing season but is not yet ready for storage purposes. An attempt was also made by the Economic Control Board to provide temporary storage at Mtama but on account of labour shortage this temporary store is not yet complete.

### Soil Conservation

Except in Songea District soil erosion is not yet a serious matter in Southern Province. On the foothills of the Makonde plateau (Newala and Masasi Districts) regulations have been laid down regarding cultivation on steep slopes but due to the lack of continuity of European staff in Masasi District it has not been possible to enforce these measures. In Songea, cultivators in the Matogoro hills near Songea township have already been informed by the Administration that they will have to vacate their cultivations on steep slopes after the 1949 main rains crops have been harvested. People in this area (who are all recent immigrants) have been directed to put in contour banks time and time again but any contour banks made are broken down by themselves in the process of weeding. The "pit" system of cultivation practised for long in the Matengo highlands of Songea District is tending to be replaced by flat cultivation and it is unfortunate that "flat" cultivation was permitted in the first year of clearing from bush. The inevitable result is that Africans go on cultivating on the flat long after the land has been cleared from bush. Slopes in Matengo country have to be seen to be believed but where the "pit" system of cultivation is used there is no danger from soil erosion.

### Game and Vermin

Game and vermin still far too high a toll of native crops in the Southern Province. Wild pig and baboon are possibly the worst offenders and are extremely difficult to deal with on account of the scattered nature of the cultivations. Hippo are far too common in lakes and rivers and the amount of damage they do is far in excess of what they eat. Dry-season crops near lakes and rivers which form so important a part of the Southern Province agriculture suffer severely from damage by hippo but as yet no serious attempt to reduce their numbers has been possible.

The event of major importance as regards African agriculture in the coastal belt of the Southern Province was the outbreak of rats. The risks attendant on a rat poisoning campaign were considered too great and no such campaign was carried out. It was unfortunate that this decision was made since as soon as rat outbreaks reach epidemic proportions trapping is of little avail. The rat epidemic ran its course and it is no exaggeration to say that several thousand tons of produce were lost because of it. As the 1949 planting season drew nearer the whole subject was re-examined and it was agreed to start a poisoning campaign. This has been carried out in October, November and December with considerable success. The material used was Barium Carbonate.

### Mahiwa Rice Station

From January until May 3, 1948, the Mahiwa Rice Station came under the supervision of the Agricultural Officer, Masasi, there being no European

resident at Mahiwa. This arrangement was unsatisfactory and the Agricultural Officer, Masasi, was transferred to Mahiwa on 3rd May. He remained there until departing on vacation leave on 14th September, 1948. Mr. Jackson, Agricultural Assistant, arrived on first appointment in August and has been in charge of Mahiwa since Mr. Morrison's departure.

*Buildings.*—At present all buildings at Mahiwa are thatched and many of them have had to be re-thatched during 1948—only three years after the station was opened. It is obvious that a permanent roofing material will be far cheaper in the long run.

*Livestock.*—The herd of Boran cattle have done well. There have been three deaths from trypanosomiasis but there have been no further outbreaks since the grazing grounds were changed.

*Experimental work.*—The experimental work on rice can be summarised as follows :—

(a) Afaa ex Dar es Salaam has given a significantly better yield than Tunduru Sifara at Mahiwa under what might be termed ideal conditions for rice growing. Under the local system of growing flood-land rice without bunds to hold up the water local Sifara is probably still the more suitable variety.

(b) There is no significant difference in yield between Tunduru Sifara and Sindano varieties; Sindano is not a common variety locally and in my opinion could well be dropped from this trial in favour of a more popular variety.

(c) There is no significant difference in yield between the $6'' \times 6''$ and $8'' \times 8''$ spacing.

(d) Selection of high-yielding strains continues; four such selections which have given consistently high yields are being multiplied.

(e) A trial has been conducted to find out the best treatment of rice lands after the rice has been harvested and before the next crop is sown. Maize, sweet potatoes and cowpeas were grown but of these only cowpeas gave a worthwhile yield. All dry-season crops were grown on the flat but since ridging of rice lands after harvest has given such good results in Zanzibar this will now be tried at Mahiwa.

(f) Local Africans grow their rice on the flat and have not yet taken to the construction of rice-dams or bunds. A trial was made to find out whether contour banks would hold up water sufficiently to improve rice yields and if so at what maximum vertical interval they should be spaced. Results show that yields fall off rapidly after the twenty-eight inches vertical interval is passed and on the information so far obtained it is proposed that these contour banks should be spaced at not more than two feet vertical intervals. On the rice land at Mahiwa with a fall of one in seventy, banks put in at the maximum of two feet vertical interval would be 140 feet apart. In practice, this distance might well be reduced.

(g) Ox-cultivation of rice-lands between such contour banks is perfectly feasible and the use of work-oxen has reduced cultivation costs at Mahiwa enormously. The oxen were acquired in 1948.

### Experimental work on other crops

(a) *Sorghum variety trial.*—The short-term sorghums tried so far have not given very good yields and since they are all soft-grained they store badly on the coast.

(b) *Hybrid-maize.*—Four varieties of hybrid maize ex U.S.A. were planted in observation plots. These varieties are of doubtful value locally in view of the yields obtained.

(c) *Tropical Kudzu.*—This suffered so badly during the dry weather that it was presumed to have died out altogether. With the advent of the short rains, plots on heavy land produced a vigorous growth, while on light erodable land the growth was poor. Flowers formed but no viable seed was set.

(d) *Oil Palms.*—Seeds of "Pedigree" and "Deli" oil palms received from the Belgian Congo have been raised, and will be distributed in 1949. "Pedigree" seedlings gave far better vegetative growth than "Deli" plants.

(e) *Vegetable growing.*—Although the difficulties of growing European-type vegetables at Mahiwa are great, far greater success was obtained in 1948 than was expected. Two separate "gardens" have been used—valley-bottom land during the dry season and land immediately above flood level during the rains. Previous attempts to grow vegetables on the dry sandy "upland" soil were unsuccessful.

### Groundnut Scheme

The Southern Province section of the Groundnut Scheme will ultimately be the largest of all the Groundnut Scheme areas in Tanganyika but up to the end of 1948 only experimental areas had been cleared for planting.

### Summary

From the agricultural point of view the year 1948 was moderately successful. Rains were up to average but not so good as in 1947 when record crops were obtained. But for a plague of rats at planting time the year could have been far more successful.

J. K. Robertson,
*Provincial Agricultural Officer,*
*Southern Province*

*ANNEXURE I*

## EXPORTS FROM LINDI, MIKINDANI AND KILWA
## (IN TONS)

| | 1938 | 1939 | 1940 | 1941 | 1942 | 1943 | 1944 | 1945 | 1946 | 1947 |
|---|---|---|---|---|---|---|---|---|---|---|
| Groundnuts ... ... ... | 1,737·89 | 2,278·88 | 1,763·00 | 1,697·25 | 1,744·49 | 1,401·91 | 954·39 | 1,755·98 | 373·60 | 991·11 |
| Sesame ... ... ... ... | 5,228·88 | 4,569·15 | 1,887·00 | 3,574·57 | 4,099·80 | 5,162·38 | 2,653·82 | 3,223·96 | 2,976·70 | 3,344·23 |
| Mtama ... ... ... ... | — | — | 1,403·00 | 2,179·42 | 4,712·75 | 4,265·33 | 2,002·91 | 2,056·00 | 117·75 | 4,253·91 |
| Maize ... ... ... | — | — | 201·00 | 74·23 | 17·50 | 1,759·10 | 1,504·60 | 48·40 | 10·10 | 1,932·39 |
| Pulses ... ... ... | — | — | 77·00 | 225·67 | 294·63 | 521·49 | 338·56 | 857·68 | 53·15 | 4,976·19 |
| Cashew Nuts ... ... ... | — | — | — | — | 172·84 | 269·24 | 354·55 | 3,971·97 | 1,900·43 | 1,312·72 |
| Beeswax ... .. .. ... | 173·60 | 85·48 | 160·00 | 239·55 | 149·61 | 151·18 | 112·57 | 44·61 | 331·15 | 51·54 |
| Tobacco ... .. ... ... | 215·01 | 477·90 | 291·00 | 581·60 | 320·37 | 169·66 | 177·84 | 129·53 | 185·81 | 126·50 |
| Cassava ... ... ... ... | — | — | — | — | — | — | 7,957·02 | 261·60 | 1,870·92 | 2,244·06 |
| Wild Rubber ... ... ... | — | — | — | — | — | — | 64·39 | 118·55 | 45·81 | — |
| Gum ... ... ... ... | — | — | — | — | — | — | 162·94 | 112·96 | 196·52 | 61·77 |
| Mangrove Bark ... ... ... | — | — | — | — | — | — | 1,575·00 | 3,455·25 | 1,238·95 | 3,548·00 |
| Colombo Root .. ... ... | — | — | — | — | — | — | 192·20 | 346·80 | 85·19 | 96·99 |
| Native Starch ... ... ... | — | — | — | — | — | — | 253·25 | 108·42 | 100·70 | 12·67 |
| Copra ... ... ... ... | 643·90 | 832·56 | 441·00 | 715·43 | 544·30 | 683·77 | 809·06 | 699·47 | 635·05 | 625·31 |
| Other Grain ... ... ... | 2,190·14 | 7,070·16 | 229·00 | 513·42 | 909·73 | 90·45 | 84·29 | 369·90 | 41·60 | 13·50 |
| Millet ... ... ... ... | — | — | — | — | — | — | — | — | 122·05 | 769·71 |
| Rice ... ... ... ... | 757·51 | 2,269·59 | 1,070·00 | 1,262·20 | 1,319·44 | 90·02 | — | — | — | 536·95 |

*Plant diseases.*—More detailed information on most of the diseases listed below is given in other publications of the laboratory.

### Field Crops

*French beans.*—Comparatively dry weather discouraged disease generally, and the only serious trouble was Halo blight on a few farms. A Memorandum on this season's observations was distributed to all bean growers. French bean diseases are discussed in a paper which has been submitted for inclusion in a Departmental Pamphlet on beans.

*Chick pea.*—Blight (*Ascochyta rabiei* (Pass.) Labrousse) was not recorded this season.

*Coffee.*—Fructifications of *Armillaria mellea* were seen on a coffee tree at Lyamungu; some green twigs were still present on the tree six months after the fructifications were first noticed—indicating slow spread of the disease through this tree.

Damping-off has again been present in cuttings being propagated in frames; in addition to the usual *Rhizoctonia solani*, a *Pythium* sp., probably *P. de Baryanum* was found.

*Cotton.*—Black arm was reported to be freely prevalent in the Lake Province. Ascochyta blight (*A. gossypii*) was recognized on only one station, Ukiriguru, this year.

*Eleusine.*—The *Piricularia* causing Blast in this host is morphologically very similar to *P. oryzæ* in rice, but Eleusine material sent to the Commonwealth Mycological Institute was considered by the Director to be almost certainly *P. setariæ* Nisitado. These two species of Piricularia are recorded to have different host plants.

*Flax.*—Mildew (*Oidium lini* Skoric) was present at Ngare Nairobi.

*Groundnut.*—A Crown rot of groundnut plants at Kongwa was associated with a species of Aspergillus. Pathogenicity tests at the laboratory were inconclusive.

*Pawpaw.*—A die-back was present in moderate amount on many farms; it was proved by inoculation experiments to be caused by the common leaf-spotting fungus *Ascochyta caricæ* Pat.

This mosaic was destructive in scattered one-year old trees on one farm; on an isolated half-acre field of two-feet high plants on another farm all the plants had severe leaf symptoms. The affected trees and seedlings were destroyed; a few months later no new cases were seen, but vigilance will be necessary.

*Passion fruit.*—Brown spot (*Alternaria passifloræ* Simmonds) was found in vines at Lushoto; it was confined to the leaves and not serious.

*Potato.*—Irish blight (Phythophthora infestans (Mont.) de Bary) has again been very destructive in the Usambara Mountains. A strain of *P. infestans* in material collected by Mr. C. J. McGregor, Senior Agricultural Officer, at Lushoto has been named Strain "E" by Dr. W. Black of Edinburgh. Of the potato varieties kindly provided by Dr. Black for trial in this Territory only his No. 131803) appears to be resistant to the new strain, but it is susceptible to

Leaf-roll. The latter disease has still not been found outside the Usambara and Uluguru Mountains. Dr. Black visited the Territory in February and toured all the potato areas; his report on Blight and Leaf-roll is most useful.

*Sorghum.*—Sorghum diseases are described in English and Kiswahili version of a Pamphlet on Sorghum to be published by the Department.

*Tobacco.*—The presence of Angular spot (*Pseudomonas angulata* (Fromme and Murray) Stapp) has been confirmed by Dr. J. C. F. Hopkins, Chief Botanist and Plant Pathologist, Salisbury, who visited the tobacco areas of the Southern Highlands Province in May.

The Kromnek disease in the Iringa area has so far proved to be a mild form, though it has spread to all the Iringa tobacco farms this season.

*Wheat.*—Stem rust (*Puccinia graminis*) was collected in the Northern Province of the Territory by H. C. Thorpe, Senior Plant Breeder, Njoro; the forms present were identified by Dr. R. M. Nattrass, Senior Plant Pathologist, Nairobi, as K.1 and a new form K.8, and also K.2, K.6 or K.7. The new form K.8 was obtained at Ngare Nairobi and Oldeani on the varieties 261 and 294.

*Tea.*—Intense leaf-spotting and leaf-fall in a restricted area of the Usambara mountains was caused by a sterile "gemmiferous fungus". This fungus had previously only been known in the Southern Highlands Province. The disease is described in an article to be published in the East African Agricultural Journal in January, 1949. Thirteen indigenous host plants were noted among the affected tea in the Usambaras.

*Sunflower.*—The mosaic seen at Chimala in 1947 has not re-appeared this year. A bacterial stem-rot was present in a small proportion of the plants in a field near Moshi; *Xanthomonas solanacearum* is suspected to be the cause, but this has not been confirmed.

### Vegetables

*Broad bean.*—Root rot and Wilt were caused by *Rhizoctonia solani.*

*Cauliflower and Cabbage.*—Mosaic was observed by Dr. Hopkins during his visit to the Southern Highlands. Bacterial soft rot (*Bacterium carotovorum* (L. R. Jones) Lehm.) was destructive in these crops and in carrot and celery in a part of the Southern Highlands Province. The disease was described in the East African Agricultural Journal in July, 1948.

*Cucumber.*—Mosaic of this crop was also observed by Dr. Hopkins.

*Tomato.*—Leaf-spotting in plants at Dar es Salaam was associated with a species of Stemphylium; it was not serious.

### Trees

*Cypress.*—Canker (*Monochætia unicornis* (Cooke and Earle) Sacc.) which is known in the Usambaras was suspected in two trees in the Southern Highlands Province; these trees were felled and burned.

### Ornamentals

*Geranium* (Pelargonium sp.).—Black leg (*Pythium de Baryanum* strain) was damaging to plants at Lyamungu.

*Lilies.*—Mosaic was seen in several species of lily in widely separated areas.

*Nasturtium.*—The Helminthosporium which has been recorded previously on leaf spots has been identified by Dr. T. E. T. Bond as *H. tropæoli* Bond.

## New Records

The following list of new records of diseases made during 1948 includes a few names already mentioned above.

Balsam (cultivated varieties of Impatiens) : Mildew, *Leveillula taurica* (Lev.) Arn.

Cabbage, Cauliflower, Carrot and Celery : Bacterial soft rot, *Bacterium carotovorum* (L. R. Jones) Lehm.

Cabbage and Cauliflower : Mosaic, *vide*, J. C. F. Hopkins.

Castor : Leaf spot, *Alternaria ricini* (Yoshii) Hansf.

Cestrum : Root disease, *Macrophomina phaseoli* (Maubl.) Ashby, (*Rhizoctonia bataticola* stage).

Coffee : Damping off of cuttings, *Pythium de Baryanum* Hesse, strain.

Eleusine : Blast, *Piricularia setariæ* Nisitado.

*Enneapogon cenchroides* : *Asali* disease, *Sphacelia* sp.

Flax : Mildew, *Oidium lini* Skorio and Root disease, *Macrophomina phaseoli* (Maubl.) Ashby, *Rhizoctonia bataticola* stage.

Groundnut : Crown rot, with *Aspergillus* sp. associated.

Hollyhock : Mildew, *Leveillula taurica* (Lev.) Arn.

Lily : Mosaic, virus.

Niger oil plant : Leaf spot, *Alternaria* sp.

Passion fruit : Leaf spot, *Alternaria passifloræ* Simmonds.

Petunia : Sclerotinia disease, *S. sclerotiorum* (Lib.) de Bary.

Pumpkin : Sclerotinia disease, *S. sclerotiorum* (Lib.) de Bary.

Salpiglossus : Damping-off of seedlings, *Pythium de Baryanum* Hesse.

*Sorghum verticilliflorum* : Rust, *Puccinia purpurea* Cooke.

Sunflower : Bacterial stem rot, unidentified (*Xanthomonas solanacearum* suspected).

Tea : Leaf spots, *Cercospora theæ* Breda de Haan and *Phyllosticta theæ* Speschnew.

Tobacco : Angular leaf spot, *Pseudomonas angulata* (Fromme and Murray) Stapp, is confirmed.

Tomato : Early blight, *Alternaria solani* (Ell. and Martin) Sorauer, and leaf spot, *Stemphylium* sp.

Zinnia elegans : Leaf spot, *Alternaria zinniæ* Pape.


## Acknowledgments

Grateful acknowledgment is made to Dr. W. Black and to Dr. J. C. H. Hopkins for their visits to the Territory and for their valuable advice and reports. Thanks are also due to the Director and staff of the Commonwealth Mycological Institute and to Dr. T. E. T. Bond for identifications of fungi.



Geo. B. Wallace,
*Plant Pathologist*

*Locusts.*—Locusts continued to occupy the majority of the time of the Entomologist, Lyamungu. A small laying of Desert Locusts took place at the end of 1946 at Masinde, and was rapidly destroyed. A small immature swarm of the same locust was reported near Longido and a small band of hoppers was destroyed near Kondoa Irangi in February. Thereafter Tanganyika remained clear of Desert Locusts.

In February, however, an infestation of Red Locust hoppers was reported in the Malagarasi area. Some of these hoppers were destroyed by local efforts, but owing to various causes, chief of which was the exceptional flooding of the area, escapes occurred. The Entomologist despatched a locust officer from the Desert Locust organization to assist, and himself flew over the area in May. In the latter half of May escape swarms were crossing the Kasulu-Kibondo districts into Ruanda Urundi.

At a Conference in June at Abercorn and Lusaka it was decided that an all-out effort must be made to arrest this outbreak of Red Locust if possible, and it was decided that in addition to strengthening the International Red Locust Control Service to deal with breeding in the Rukwa and Mweru wa Ntipa, efforts must be made to destroy all breeding outside these areas. The sum of £100,000 was voted for the purpose, and particular stress laid on the danger of breeding in the Malagarasi. The Entomologist, Lyamungu, was transferred to Tabora to take charge of all work in Tanganyika outside Rukwa.

A full report of this campaign was submitted to the Salisbury Conference in May, 1948, but in brief it may be stated that between July and December a staff of eleven European locust officers was built up, and vast area of country opened with lorry tracks; camps were built and stocked with food for labour, and with gammexane and pumps, and a scouting organization arranged. Everything was in readiness for a campaign, and the first hoppers of Nomandacris were reported on 31st December from the Usinge swamps, south of the Central Railway.

*Other work.*—As a result of a memorandum submitted in 1946, the Entomological work in Tanganyika was divided as follows :—

*Entomologist, Lyamungu:*

Locust.
Coffee pests.
Banana weevil.
Wheat pests.
Sugar cane White Grubs.
Onion Thrips.
Bean pests.
Pawpaw pests.
Potato pests.
Cutworms.
Pyrethrum.

*Entomologist, Morogoro:*

Maize and Sorghum pests.
Cotton pests.
Grain and Bean storage.
Sisal weevil.
Coconut beetle.
Beeswax development.
Eelworm.
Sweet potato weevil.
Groundnut pests.
Sesame pests.

Work was continued with D.D.T. and Gammexane against coffee pests, particularly Antestia. A description of the use of a D.D.T. kerosene soap emulsion was published in the *Tanganyika Standard* and the *Coffee Board Bulletin*. The method proved the most effective means so far used against Antestia, and is now used exclusively at the Coffee Research Station against this pest: it also appeared very promising against Thrips though it was not possible to test its use against Thrips exhaustively. An attempt was made to introduce a parasite, Eulophus sp. of the leaf miners, *Leucoptera coffeella* and *L. caffeina* from the Usambaras to Kilimanjaro. The very small amount of Arabica coffee left at Amani made the material difficult to obtain, and the few adult parasites hatched out at Lyamungu died during the Entomologist's absence on locust work. Further attempts should be made when possible, but the absence of an assistant makes this type of work very difficult. Work with insecticides against leaf miner gave no encouraging results.

The results of previous work both by the Entomologist, Lyamungu, and Mr. Kirkpatrick, late of the East African Agricultural Research Station, Amani, were written up for presentation to the *Bulletin of Entomological Research*.

Some work on *Anthores leuconotus* (White Stem Borer of coffee) and *Melanagromyza phaseoli* (Bean fly) was commenced, but had to be abandoned owing to locust duties.

*Publications.*—

"D.D.T.'s Value against Coffee Bug Proved", Notley, F.B., and Sanders, F. R., *East African Standard*, May 2nd, 1947.

"Antestia, the Coffee Bug, and D.D.T.", Notley, F. B., and Sanders, F. R., *Coffee Board Bulletin*, October, 1947.

"The Leucoptera Leaf Miners of Coffee on Kilimanjaro", Notley, F. B., *Bulletin of Entomological Research* (in the press).

F. B. Notley,
*Entomologist*

## REPORT OF THE ENTOMOLOGIST, 1948

The Entomologist, Lyamungu, remained on duty throughout the year. Dr. Jepson left on long leave on 16th May, and was later seconded to the Imperial College of Science.

*Locusts.*—The Entomologist remained in Tabora, in charge of the Red Locust campaign, from the beginning of the year until 4th June, when he returned to Lyamungu. A full report of this campaign was submitted to the Salisbury Conference in May, 1948; it is only necessary to record here that the hopper infestation was lighter than had been expected, being confined to the Usinge and Lumbwe swamps south of the Central Railway; all known hopper bands were destroyed, and no reports of escape swarms were received. Tanganyika has remained clear of all species of locusts from May until the end of the year. It is a pleasure to record the compliments of the Salisbury Conference (Minute 10) and a congratulatory telegram from the Secretary of State from the Colonies, received in June, on this work.

*Coffee.*—A special investigation of the causes of the threatened failure of the Bugufi coffee industry was undertaken in October. This was found to be due primarily to the ravages of Antestia which was estimated to destroy about two-thirds of the crop. Owing to the difficulties of transporting large quantities of water to the native plots concerned, a method was investigated using the D.D.T. kerosene soap emulsion at a much higher strength but at a much reduced dosage per tree. Experiments in Bugufi and later under more carefully-controlled conditions at Lyamungu, showed that adequate control could be obtained using as little as four ounces D.D.T. applied in eight gallons of spray per acre. A description of this method, which reduces the cost of D.D.T. spraying to that of arsenite baiting, and is quite practicable for native plots, was submitted for local publication.

Along with the testing of this new method, tests of other methods of control were undertaken, together with an examination of the results of the various methods of control used in the past at the Coffee Research Station.

Field tests of sprays and stem painting against *Anthores leuconotus* (White Borer and coffee) were laid down in September. The results will not be known for several months. A field trial, using various insecticides, against *Melanagromyza phaseoli* (Bean fly) was laid down in July, but the pest failed to put in an appearance, and the plots were again planted out with beans in December.

*Bean fly* does not normally cause serious damage to beans planted in the long rains, but it was mistakenly hoped that some preliminary results might be obtained.

*Sisal.*—During December three trial shipments of *Leionota quadridentata* were received from Dr. Simmonds at Trinidad, to test the method of packing. These were all received in excellent condition, and after trial in the laboratory against Scyphophorus grubs (sisal weevil) which they successfully attacked in their burrows, released at the beginning of January at the Sisal Research Station, Ngomeni. Further bulk consignments of *Leionota*, *Plæciua* and *Dactylosterum* are expected in the new year, and concentrations of material infested with sisal weevil are being made so that they may have every opportunity to multiply.

An entomological exhibit was staged at Arusha Agricultural Show early in November.

*Publications:*

"Red Locust Control", Notley, F. B., *Monthly Letter*, June, 1948.

"Red Locust Control", Notley, F. B., *Tanganyika Territory News Supplement* No. 17, 13th August, 1948.

"Recent Developments in Locust Control Measures", Notley, F. B., *Monthly Letter*, August, 1948.

"Testing for Antestia Incidence", Notley, F. B., *T.C.G.A. Circular.*

"Antestia and D.D.T.", Notley, F. B., *T.C.G.A. Circular.*

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*Entomologist*

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## BOTANIST'S REPORT ON FOOD CROPS WORK FOR 1948-49 SEASON

*General.*—The season was the worst recorded for eighteen years, good rains in October, November and December being followed by a long dry spell with only very occasional showers, the March rainfall being only 0·32 inches. The April rains were good, but May was again a bad month (0·73 inches) and no rain fell in June. Under the circumstances, this year's results are very satisfactory, and demonstrate clearly the value of the methods worked out by Messrs. Peat and Prentice, but many of the crop varieties worked with have not had a fair trial, and judgment cannot be passed on them.

*Sorghums.*

A. *Selection work.*—Approximately 950 sorghum selections have been made. The main search has been for a grain which will store well in the short-term sorghums and there is no reason to suppose that this character will be impossible to obtain, but it may take some time to obtain it in combination with good yield and palatability, as many of the grains which look hopeful came from very poor heads. Both from the literature, and from observation here, it appears that soft grains store badly, but although good storing grains are hard, by no means all hard grains store well. Examination of numerous grains here has shown that all the good storing grains examined have a clear, hard flinty layer under the seed coat, and distributed all over the grain with the exception of the embryo. Many hard grains have such a flinty layer, but unevenly distributed, so that there are soft patches, usually occurring at the apex of the seed, and it is possible that weevil attack such weak points. Selections have been made on the assumption that the thickness and distribution of this layer governs the resistance of the grain to weevil attack, but it should be emphasised that this is only a working hypothesis which has to be confirmed by storage tests. Such tests are being carried out

by enclosing one hundred seeds of each variety in muslin bags, and keeping them in weevily grain, counting the damaged seeds at intervals. Other characters such as yield, vigour, grain size and colour, panicle type and absence of stalk-borer have been taken into account in selecting.

One hundred and fifty of the selections taken earlier in the year were grown in progeny rows at Ukiriguru and Mwabagole, and of these about one-third appear to be worth retaining for planting next year. There were some indications that attractiveness to borer may be an inherited character, as in progeny rows selected from Feterita S.P.24 there was eleven per cent of attacked plants (395 plants), in those selected from D.D. Feterita Hanagil there was 0·8 per cent of attacked plants (256 plants). All rows were grown three feet apart in a compact block.

No character responsible for resistance to stalk-borer has been satisfactorily tracked down, but there are indications that thick, sappy and relatively soft stems are far more attractive to the insect than the more slender, tough and "wiry" stems.

B. *Crossing.*—The technique of emasculating heads by hot water treatments is easy to carry out, and judging by discoloration of the anthers is effective. It remains to be seen whether the grain obtained, using pollen from another variety, is in fact hybrid.

C. *Reference Collection.*—A collection of sorghums planted on the mbuga on 18th November in plots 12 × 12 gave rather poor yields, suffering from the dry weather in January-February. This was largely influenced by their length of maturity, as the longer maturing varieties were more seriously affected by the drought than the early ones. All were planted on 18th November, 1948, and Early Hegari, which matured in less than three months gave 850 lb. per acre, while P.41 which was very slightly later gave 650 lb. per acre. Those which matured a fortnight to a month after this gave yields varying from 460 to 150 lb. per acre.

It was evident that there had been some mixing, and quite a lot of crossing in the varieties grown, and it will be necessary to select and bag heads next year to obtain the varieties pure. It will also be necessary to gain some idea of the extent of natural crossing, and all heads in the progeny rows have to be bagged to ensure selfing.

Several of the American varieties in addition to Early Hegari look promising; three of the D. Shallu varieties are showing up well in the storage tests, and have a palatable grain, but seem to take over four months to mature. Plainsman is also storing well, but its grain is rather bitter, and in common with most of the American types, it matured in over four months.

One of the Belgian Congo varieties (B.C.23) looked hopeful, and is storing well, and a Dobbs type (No. 4 ex-Kenya) is storing much better than the ordinary Dobbs here, although it gave a poorer yield in the reference collection. Most of the other varieties in the collection were poor this year. Queensland Wheatland Milo looks quite promising on the hill, and appears to have quite a good grain. The grains planted in February had sufficient rain for them to germinate, and were able to survive until the rain came in April, when they made good growth, and gave satisfactory yields. The Swaziland bulks on the hill planted in February gave very good yields, P.41 running at 900 lb. per

acre in an eight-acre block (manured 1947), P.127 giving 550 lb. per acre in a two and a half acre block (never manured), and P.133 650 lb. per acre in a two and half acre block (never manured). All were infested with grain smut.

A small Dobbs bulk on the hill planted in February grew very well, but did not fill the grain well owing to dry weather, and yielded 700 lb. per acre on one acre (never manured). On the whole, Dobbs has gone down very badly with grain smut this year, and the early planted Dobbs at Lubaga was riddled with stalk-borer. Selections for earliness were made in Dobbs.

A bulk of B.C.27 white gave a yield of 650 lb. per acre in a block of three and a half acres (manured 1948) on the hill, and proved to be very heterogeneous material. Selections were taken for earliness of maturity, panicle character, and grain characters from this bulk.

*Sorghum Experiments.*—The Striga trial showed up very clearly the effect of clean weeding at fortnightly intervals, the yields obtained being :—

| | | |
|---|---|---|
| Clean weeded | ... | 530 lb. per acre. |
| Not weeded | ... | 10 lb. per acre. |

The difference in growth early in the season was very marked even before any striga was visible above ground, there being a difference in height of over one foot between the weeded and not weeded plots after a little more than two months' growth. Tridax repens was the dominant weed in the unweeded plots, and formed a thick cover, but although it was probably responsible for some of the depression in yield, it seems certain that the main effect is due to Striga, as the depression was noticeable in the early stages when the plots were comparatively free from Tridax. This experiment over a period of years has demonstrated that Striga can reduce sorghum yields to almost nothing on the mbuga, and that clean weeding every fortnight controls the parasite.

An experiment laid down for the Plant Pathologist indicated that Sulphur, Hormoson and T.M.T.D. seed dressings greatly reduce the incidence of grain smut in sorghum, but have no effect on loose smut. Unfortunately the incidence of smut in this experiment was not great enough for definite conclusions to be drawn.

*Maize.*—Eighty-one selections for earliness were made in Katumbili Maize. It was a very poor year for maize, although yields were obtained here when it was a total failure in the surrounding native shambas. Yields here averaged four bags per acre of grain on the mbuga, and three and a half bags per acre grain on the hill. All was planted on a heavy shower of rain early in February.

Streak was not showing up at all well in the maize on Uzinza, and it was decided that selections should be left for a year of better rainfall when the symptoms would be more pronounced.

*Rice.*—The pump was relied upon for nearly the whole season, which meant that only about fourteen acres of rice could be grown. Much of this, however, grew under good conditions, as the water could be well controlled, and yields were satisfactory, except for a few areas where transplanting was very late owing to insufficient water.

*Trials:*

1. *Manurial Trial.*—Eight treatments were applied on plots 20′ × 20′ laid out in a Latin Square. The plot size (harvested) was 336 square feet (1/129 acres).

The following yields were obtained :—

| Treatment. | Yield/acre paddy lb/acre | % of Control | Yield/acre straw | % Control | Tillers |
|---|---|---|---|---|---|
| Cassia 4 tons/acre ... | 6,670 | 128 | 6,650 | 152 | 7·2 |
| Tree Cassava 4 tons ... | 6,330 | 122 | 5,900 | 137 | 7·5 |
| Pen Wastes 4 tons ... | 6,200 | 119 | 4,820 | 112 | 7·0 |
| Cassia 2 tons ... ... | 6,180 | 119 | 5,650 | 131 | 7·4 |
| Physic Nut 2 tons ... | 6,120 | 118 | 5,440 | 126 | 6·8 |
| Tree Cassava 2 tons ... | 5,860 | 113 | 5,100 | 119 | 6·9 |
| Puddled only ... | 5,460 | 105 | 4,510 | 105 | 7·0 |
| Control ... ... | 5,200 | 100 | 4,300 | 100 | 6·7 |

L.S.D. paddy (·05)—635 lb./acre L.S.D. paddy = (·05) = 12 per cent.

The increase from the puddling in of green material was greater in 1948, when a forty-per-cent increase on the four-ton treatment of Tree Cassava and Cassia was obtained, but the yield from the Control plots was very much higher this year (5,200 compared to 3,440 in 1948). The "puddled only" treatment showed an insignificant increase over control. The yield of straw is greatly increased by this treatment, and the relative grain to straw weights are shown below :—

| Treatment | 1949 Grain | 1949 Straw | 1948 Grain | 1948 Straw |
|---|---|---|---|---|
| Cassia 4 tons/acre ... ... | 100 | 100 | 100 | 105 |
| Pen Wastes 4 tons/acre ... ... | 100 | 78 | 100 | 104 |
| Tree Cassava 4 tons/acre ... | 100 | 92 | 100 | 117 |
| Cassia 2 tons/acre ... ... | 100 | 91 | 100 | 100 |
| Physic Nut 2 tons/acre ... | 100 | 89 | 100 | 96 |
| Tree Cassava 2 tons/acre ... | 100 | 87 | 100 | 102 |
| Puddled only ... ... ... | 100 | 83 | — | — |
| Control ... ... ... ... | 100 | 83 | 100 | 99 |

In 1949, there was relatively more grain to straw in the control plot than in the plots treated with green material, although the Pen Wastes treatment gave a higher ratio of grain to straw than control. The possibility that with more water the puddling in of green material would yield a greater increase of grain than that obtained in 1948 or 1949 remains to be investigated. This year, the rice was transplanted within two days of puddling in the green material, whereas previously an interval of one month has been allowed between application and transplanting.

2. *Rice Variety Trial.*

A. *Selections from Kahogo.*—Fifteen selections from Kahogo were planted out in Randomized Blocks with ten replications. The plot size used for obtaining the yields was 48′ × 2′, the size planted being 50′ × 4′, and the whole experiment was harvested in single lines 24′ long, from which the most suitable plot size for future experiments will be calculated when time permits.

| Selection | Yield (lb./acre) | % of Kohogo |
|---|---|---|
| 7/13 | 4,620 | 110 |
| 7/9 | 4,460 | 107 |
| 7/8 | 4,400 | 106 |
| 6/5 | 4,400 | 105 |
| 6/10 | 4,390 | 105 |
| 6/8 | 4,340 | 104 |
| 7/11 | 4,290 | 103 |
| 7/14 | 4,210 | 101 |
| 7/12 | 4,180 | 100 |
| Kahogo | 4,180 | 100 |
| 7/10 | 4,120 | 99 |
| 6/7 | 4,070 | 97·5 |
| 6/4 | 4,060 | 97 |
| 6/2 | 4,040 | 97 |
| 7/7 | 3,980 | 95 |

L.S.D. (·05) = 320 lb./acre = 7½ per cent.

It is hoped to carry out milling tests on these selections, and to obtain an estimate of their quality. Observations during the season did not show any with noticeably better straw or non-shattering characters than Kahogo.

B. *Variety Trial.*—This was a comparison of seven rice varieties and selections, laid out in Randomized Blocks with ten replications. The following yields were obtained :—

| Variety or Selection | Yield (lb./acre) | % of Kahogo |
|---|---|---|
| 2/16 | 4,000 | 119 |
| Maji Maji | 3,980 | 118 |
| 1/18 | 3,953 | 117 |
| Afaa Mwanza | 3,410 | 101 |
| Kahogo | 3,370 | 100 |
| 2/9 | 3,350 | 99 |
| 2/8 | 3,280 | 97 |

L.S.D. (·05) = 325 lb./acre = 9·6 per cent.

These yields tally well with results obtained in previous years. 2/16 (ex Afaa Kilombero) has outyielded Afaa Mwanza in previous trials by thirty-one per cent and forty-six per cent, and was graded by Ladha Meghjees in Mwanza in 1944 as being of slightly better quality, and giving a better polished rice than Afaa Mwanza. It is inferior to Kahogo.

3. *Broadcasting into Water.*—On Mr. Thornton's suggestion, an observation trial was laid down to compare the yield from the broadcasting of pre-soaked rice seed into two inches of water, with that obtained from rice transplanted in the ordinary way. Kahogo was used, and the germination in the broadcast plots was very poor indeed, and although the standing water reduced weed growth, this was no compensation for the poor stand obtained. It was interesting to note the extent to which Kahogo will tiller when widely spaced, and on the broadcast treatment, the average number of tillers was forty per plant, and a yield of 248 lb. was obtained from 774 plants, or approximately five ounces per plant ; the transplanted plots yielded 370½ lb. on an equivalent area, and gave approximately one-quarter ounce per plant. There seems to be little point in pursuing this method any further.

The rice yields in the small bulks were better than last year, twelve varieties yielding over 1,000 lb. per acre, and ten varieties yielding from 3,000 lb. to 4,000 lb. per acre. These received no special treatment, but being located near the pump house, they received a very good water supply.

4. *Bulrush Millet.*—No selection work was done on this crop. Yields of unmanured millet on the hill averaged nearly three bags per acre.

5. *Setaria Millet.*—Twenty selections for size of head and vigour of plant were taken. It gave a poor harvest owing to the drought.

6. *Panicum Millet.*—This did very badly, and no selections were taken.

7. *Eleusine Millet.*—Again, there was a very poor stand, and only six selections for size of head were made.

8. *Sunflowers.*—These stood up to the drought quite well. The material here is very heterogeneous, and 255 selections were made for length of maturity, and size of head. Head size (diameter, excluding the ray florets) varied from 4½ inches to 11½ inches, and the weight of one hundred seed from 4·5 gms. to 12·8 gms. among the various selections. The Government Chemist has agreed to do oil-content analyses on some of the selections, as the yield of oil per acre is the criterion for sunflowers.

A bulk planted on the hill yielded 230 lb. seed per acre, and on the mbuga, where the plants did not stand the February-March drought so well, the yield was 83 lb. seed per acre.

9. *Legumes.*—The legumes were very badly affected by the drought, and the only ones which stood up well to it were Velvet beans, which did very well on the hill, and quite well on the mbuga. Only sixteen selections were taken from the various legumes grown.

10. *Cassava.*—Planting material from the mosaic resistant varieties was distributed in the Lake Province. A further area of about ten acres was planted up with this material, on which was superimposed a simple tie-ridge versus ordinary ridge comparison, laid out in pairs of plots, five ridges per plot, and twenty-four replications.

Observations showed that Amani 442 (B), 4029/11, 4421, 44421 (B) and Msitu Zanzibar have less resistance to the disease than the other varieties and several infected plants were found, especially in Amani 4029/11 and Msitu Zanzibar, where the symptoms were very pronounced. Numbers 442 (B), 4421, 44421 (B) are seedling material, and segregation of susceptible plants is to be expected. 4029/11 and Msitu Zanzibar are clonal.

11. *Miscellaneous.*—An experiment to test the effect of the selective weed killer Y.F.1541 on the mbuga yielded no result owing to the dry weather. The principal weed on the mbuga is Tridax Repens here. The weed killer was applied to plots of sorghum badly infested with Striga and Tridax, but the application was followed by a long, dry spell, and no difference between the control and treated plots could be observed. It was decided to keep the balance of the chemical for trial again early next season.

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# REPORT OF THE FISHERIES OFFICER FOR 1948

## I.—Staff.

Mr. G. J. Lockley, Fisheries Officer, was appointed on 15th February, 1948, and since 23rd March, 1948, has been stationed at Lake Rukwa (Chunya).

Major R. E. Gould, Fisheries Officer, arrived in the Territory on 13th December, 1948, after a short tour of fish farms in the Belgian Congo and Northern Rhodesia.

## II.—General

Fisheries work is an innovation in the Department and consequently the Fisheries Officer has had to devote a considerable amount of time to assembling equipment etc., and in laying the groundwork for the establishment of a Fisheries Organization. Many difficulties have been encountered due to the isolation of the Lake Rukwa station coupled with a lack of transport.

The Major task at Lake Rukwa during the year, has been concerned with recommendations for the reorganization of the fishing industry with especial reference to the granting of concessions and with the devising of regulations for the protection of the fish stocks. Proposals in these matters are at present under consideration by Government.

In June the Fisheries Officer undertook brief tours in Lake Nyasa area of the Rungwe District and on Lake Tanganyika.

In March, 1949, the Fisheries Office (Inland Fisheries) will be transferred to Kigoma for work on Lake Tanganyika.

## III.—The Lake Rukwa Fisheries in 1948.

1948 has not been a particularly good fishing year on Lake Rukwa. Statistics from the European industry, which form the only reliable gauge of the trend of the fishery, indicate a ten per cent drop in the total catch of *Tilapia* compared with 1947 and a sixteen per cent drop compared with 1946 (which was described as "a comparatively poor fishing year" by Mr. G. H. Swynnerton of the Game Department who investigated the fisheries in that year). The drop in catches is in spite of an increase in fishing power and the possibility of overfishing cannot be ignored. It is considered that increased protection of the fish stocks is overdue. Nevertheless, other factors may be causing a drop in catches. The poor rains experienced in this area over the past few years have undoubtedly affected the Lake which, at the end of 1948, was at the lowest level in the memory of local residents. The North Lake, which is much shallower than the main basin, has dried out completely on several occasions in the past fifty years. It is very low at the present time and reports have been received of fish dying there. The only outlet of the Lake is by evaporation and this mortality is almost certainly due to the high concentrations of soda in this shallow water. No relief can be expected until the affluent rivers are in flood.

Crocodiles are a factor which cannot be ignored. This pest is virtually uncontrolled and appears to be on the increase. Apart from their direct

depradations on the fish stocks, crocodiles prevent the use of certain fixed fishing gear in the open waters which would be particularly effective for catching certain species of predaceous fish which also prey on *Tilapia*. In addition, fishing effort has been lost by crocodile damage to seine nets and by their increasing boldness in interfering with native canoe fishermen.

In July the Game Department granted permission to one of the European fishing concessionaires to kill crocodiles for commercial purposes. Simple methods of catching, killing and preparing the hides were soon evolved but the high cost of salt for curing and of transport to the nearest market (Nairobi) left little profit margin with the prices prevailing for the skins. It therefore appears unlikely that the establishment of a crocodile hide industry will be a sound economic proposition and as the fisheries are Rukwa's main asset, steps should be taken to reduce the crocodile stocks on a large scale.

*The European Fishing Industry.*—The European fishery was conducted by three concessionaires whose activities were confined to a thirty mile stretch of the north-east shore-line of the Lake lying in the Chunya District. It was almost entirely a "one crop" fishery for the "ngege" (*Tilapia rukwaensis*) which was fished for, in inshore waters only, by beach seines. The bulk of the catch was cured for African consumption, mainly as labourers rations.

Total production of *Tilapia*, by all concessionaires, was as follows :—

| | No. of Fish |
|---|---|
| January ... ... ... ... ... ... | 294,902 |
| February ... ... ... ... ... ... | Close Season |
| March ... ... ... ... ... ... | 187,496 |
| April ... ... ... ... ... ... | 200,886 |
| May ... ... ... ... ... ... | 67,795 |
| June ... ... ... ... ... ... | 58,530 |
| July ... ... ... ... ... ... | 103,080 |
| August ... ... ... ... ... ... | 126,869 |
| September ... ... ... ... ... ... | 133,133 |
| October ... ... ... ... ... ... | 86,130 |
| November ... ... ... ... ... ... | 88,604 |
| December ... ... ... ... ... ... | 113,191 |
| Annual Total ... | 1,460,616 |

An estimated weight of 730·3 tons of fresh fish.

An estimated market value of £9,000.

The monthly tabulation well illustrates the seasonal fluctuation in the catch which, with beach seining as the sole method of fishing, is entirely dependent on the concentration of fish in inshore waters. Heavy concentrations in inshore waters are associated with the peak breeding season of the fish which usually, though not always, occurs during the rains.

The unpredictability of the catch from month to month has led to marketing difficulties. The concessionaires are unable to enter into many contracts for the regular supply of fish as few, if any, stocks are held in reserve in times of abundance.

Total production figures for the past five years are given for comparison :—

| | No. of fish | Weight in tons | Remarks |
|---|---|---|---|
| 1944 ... | 1,400,902 ... | 700·4 ... | One concession only. |
| 1945 ... | 1,705,167 ... | 852·5 ... | Three concessions. |
| 1946 ... | 1,749,500 ... | 874·5 ... | Three concessions February close season. |
| 1947 ... | 1,628,852 ... | 816·4 ... | ,, ,, ,, ,, |
| 1948 ... | 1,460,616 ... | 730·3 ... | ,, ,, ,, ,, |

It should be remarked that the apparent drop in *Tilapia* catches over the past two years is in spite of a considerable increase in the fishing power employed by the concessionaires.

Since July, 1948, two concessionaires have been curing and marketing the Catfish, *Clarias mossambicus* (''kambali''), which was caught incidentally in the *Tilapia* fishery. Total catch of this fish to the end of the year was 13,937, an estimated weight of thirty-five tons of fresh fish.

*The Native Fishery.*—The main native fishery was centered in the same area as the European industry. Elsewhere on the Lake shore, fishing was scattered, spasmodic and entirely at subsistence level with the exception of a small trade fishery around Ntakasangwa in the Ufipa District. Native fishing was conducted from canoes with the ''luelo'' or scoop net and ranged into waters further off-shore than those fished by the beach seines.

Native caught fish was not landed regularly at any fixed point nor marketed through any central agency and there is therefore a dearth of statistics concerning this fishery. A considerable amount of data has been collected since April 1948, but not sufficient to warrant giving any reliable estimate of the year's total native catch which has probably not exceeded 500,000 *Tilapia*. ''Kambali'' (*Glarias mossambicus*) ranked next in importance to *Tilapia* in the native fishery. In addition, ''Konje'' (*Synodontis zambesiensis*) was caught in fair quantities towards the end of the year. This latter fish is not marketed, but is highly prized as food by the local Africans.

There has been an apparent decline in the volume and extent of African fishing over the past few years which has been due to a number of causes.

The Rukwa native is not primarily a fisherman and few are entirely dependent on fishing as a livelihood. It should be noted that where there is a drop in the density of fish, the individual canoe fisherman cannot maintain his output by increasing his fishing power other than by working an increasing number of hours or days with his one net.

There remained a great shortage of twines and other materials for the fishery. Nets continued to be made from threads picked from the canvas of old lorry tyres. Discarded tyres rose in price during the year and in any event were in short supply.

*Processing and Marketing.*—The marketable surplus of the canoe fishery was hot-smoked at the lake shore by African itinerant traders by whom it is marketed. The European catches were processed and marketed as follows :—

(a) *Fresh Fish.*—One concessionaire maintained a fresh fish trade to Chunya and Mbeya. During the year deliveries were raised to two a week in view of increasing demands from Mbeya. In November, the price of fresh fish was raised by 5 cts. per fish to 30 cts. Chunya, 35 cts. Mbeya. About 1,000 fish (1,000 lb.) per week were marketed in this form.

(b) *Cured Fish for African Consumption.*—The bulk of the catch was cured by hot-smoking and marketed in bundles of 100 fish, a large proportion going to employers of African labour. Two types of cure are prepared: salted and unsalted. The former has much better keeping qualities and an increasing amount of this type of cure was prepared during the year, the unsalted cure being made principally for near markets with quick consumption.

(c) *Other Forms.*—Limited quantities of sun-dried fish were prepared for African consumption. Small quantities of salted, unsmoked fillets and cold-smoked fillets ("haddocks") were made for the non-native market. A few hundred pounds of fish meal were manufactured during the year. This found a ready market with poultry breeders in the Southern Highlands Province.

A hold-up in marketing occurred early in the year which led to the destruction of a certain quantity of unsalted, hot-smoked fish. This was due to agency faults and there has in fact, been an increasing demand for Rukwa fish which the producers have been unable to meet.

## IV.—Experimental Work

Certain experimental fishing was conducted during the year with gill nets and trammel nets. Useful information was obtained concerning the open-water fish population but these experiments were curtailed due to damage of the gear by crocodiles. Fishing experiments were also conducted with native fish-traps of the non-return valve type.

Routine measurements and examinations of fish have been made. A small pond at Mawoga, some twenty-five miles from the lake, into which *Tilapia rukwaensis* was introduced some years ago, has been under observation and it has been established that the fish are breeding there.

A few experiments were undertaken in the processing of fish and in the investigation of by-products. The most interesting result obtained concerns the high Vitamin A potency of livers of the Catfish, *Clarias mossambicus*. Work in this field is still in progress and it is not yet possible to indicate the commercial possibilities of this discovery. Thanks are due to the Government Chemist for much advice and assistance in this project.

## V.—Introductions

The following introductions of fry of the Bluegill Sunfish (*Lepomis macrochirus*) were reported during the year;—into Lake Masoko, Rungwe District (July); into Lake Kwela, Ufipa District (September).

## VI.—New Records

A Catfish, *Heterobranchus longifilis*, Cuv. and Val., previously unrecorded from Rukwa, was captured in the Lake on 22nd August. This record is based on a notable specimen weighing 125 lb. with an overall length of seventy-three inches.

A record *Tilapia rukwaensis*, weighing 52 oz. was brought in on 8th July. The previous best was 42 oz. The average weight of an adult of this species is 18 oz.

G. J. Lockley,
*Fisheries Officer*

# SUMMARY OF THE ENTOMOLOGICAL PROBLEMS IN TANGANYIKA

*Prepared for the Fifth Commonwealth Entomological Conference*

## Preamble

It is possible to draw a broad picture of the insect pest situation in Tanganyika by stating that although the same species are constantly recorded from all the East African countries together with Nyasaland, Northern Rhodesia and the Belgian Congo, the determination of their status as pests is ruled by the particular ecological conditions associated with a country lying within 10° of the Equator, mainly below 3,000 feet and receiving less than fifty inches of rainfall in sharply defined wet and dry seasons. The natural vegetation, on soils derived mainly from acidic rocks, granites or gneisses, consists of tree or bush savannah of variable composition and densities. Only in the two highland areas in the North (Kilimanjaro) and South (Iringa) do the agricultural conditions differ radically from the main type. Crops in the former areas, apart from the European sisal and sugar plantations are food crops such as maize, millet, rice, groundnuts, cassava, pulses; cash crops such as cotton, simsim, and coconuts. In the highlands, coffee, tea, pyrethrum, tobacco, onions, potatoes and seed beans are grown on a large scale by Europeans, and some of them, such as coffee, to an increasing extent by Africans. As far as the application of entomological method is concerned, a further broad classification can be made on the basis of European and Native agriculture, and on local or cosmopolitan pest species.

2. In the summary which follows, only those species are mentioned which have caused widespread loss at some period or other during the past ten years, and against which constant control measures should be exercised.

## Pests of Food and Cash Crops

3. *Locusts.*—Tanganyika contains the main outbreak centre of the Red Locust in Lake Rukwa, and is the Southward limit of the migration of the Desert Locust. The technical aspect of all locust problems is now under the unified control of one of the two Territorial Entomologists (F. B. Notley), and the routine destruction of escape swarms or hopper bands is undertaken as an administrative duty, with technical help where necessary. Of the highly successful recent campaign against the Red Locust and of the long range international plans for locust control we shall hear more at the Conference but it shall suffice to say that it is a matter for regret that such serious and widespread pests as the Stalk Borers of maize and other graminaceous crops should not be tackled by the same kind of teamwork.

4. *Stalk Borers.*—It would not be far from the truth to assert that the white borer (*Busseola fusca* Fuller) causes more loss of food to the African than all the other pests together. When we consider that the species is prevalent from the Cape to the Sudan, it is remarkable how little is known about the mortality factors, whose differential incidence in any locality may produce catastrophic infestations. There is little doubt that the species is under a very considerable degree of natural control by insect parasites and diseases, and it is also obvious that the traditional textbook recommendation of uprooting and burning after harvest is largely vitiated by the vast reservoir of alternate host grasses, such as Pennisetum, Panicum, etc. Preliminary

trials of top dressing with chemicals such as Derris, DDT, and Gammexane in the form of Gamatox have served to demonstrate the need for fundamental research into the ecology of the insect in relation to Tanganyika conditions. The success achieved in Southern Africa by these chemical methods has been modified in Tanganyika by the quick disappearance of the toxic residues, and by the rapid increase of new untreated tissue by reason of the intense heat and moisture which typify the main growing season. It is a matter of some interest that *Busseola* is replaced in the more humid coastal areas by the Spotted Borer, *Proceras agyrolepida* Hmpsn (Pyralidæ). It is strongly to be recommended that these pests be dealt with on a Pan-African basis.

Other stalk borers of less importance, but of constant nuisance value are the Anthomyid, *Atherrigona indica* Mall which does great damage to Sorghums (Millet) in the drier areas of the Western Province, and is harboured by *Panicum* spp.: also *Sesamia calamistis* Hmpsn. the rice stem borer, which often causes complete failure of young plantings. No control measures have hitherto been applied to these insects, and it is difficult to see how even a well proven measure could be applied to the thousands of small patches of native millet and rice throughout the Territory.

5. *Banana Weevil* (Cosmopolites sordidus Germ.). This pest is now firmly established on Kilimanjaro, and is also threatening the Lake Province area round Bukoba, where the banana is the staple food of the population. In the latter area, it has not proved difficult to enforce a high standard of plantation sanitation involving the growth of single stems, but on the Kilimanjaro shambas it will be a major operation. It is hoped, in co-operation with Uganda, to obtain predator material of the general *Plæsius*, *Leioderma*, and *Dactylos-ternum* by air, through the Bureau of Biological Control, during the coming year.

6. *Armyworms* (Laphygma exempta Wlk. and L. exigua Hubn.).—The migratory bands of Noctuid caterpillars, whose sudden appearance and subsequent disappearance are of world wide occurrence, are reported nearly every year from almost all parts of the Territory, where they damage coffee, beans, and cereal crops, especially maize. Harris has made studies of their prodromal phase, and concludes that control by chemicals is only feasible if the mass generation can be identified on Star grass (*Cynodon dactylon*). There is much local lore on the subject, and it is said that a heavy flight of the *Pierid Catopsilia* florella foreshadows a heavy armyworm attack. There is little doubt that prolonged "short" rains with regular showers produce a favourable growth of the host grasses and a high survival rate of the larvæ. Experiments with a "half and half" mixture of DDT (5 per cent) and Gamma BHC (·5 per cent) applied with dust guns at the rate of 15-20 lb. per acre to four feet high maize has shown some promise, if done in time. Natural control is, of course, finally achieved by parasites and diseases, but the interactions are highly balanced and difficult to influence.

7. *Leaf eating Beetles and Grasshoppers.*—The chief species concerned with damage to native legumes is the Galerucid *Ootheca bennigseni* Wse. Although the insect could easily be checked by dusting with DDT or Gamma BHC, it is quite out of the question for the isolated African cultivator, and the key to successful insect control over a wide field appears to lie with plans for aggregation of native cultivation. Work is urgently needed on the problem of *Zonocerus elegans*, the elegant grasshopper.

8. *Coconut Beetle* (*oryctes monoceros* Ol.).—Even in well-tended groves on the coast, the ravages of the coconut beetle are apparent, and over wide areas, the scene is one of devastation. The cause of this is largely with the modern cultivator, who is not prepared to plant and maintain new groves, but is content to sit and wait for the ever dwindling crop to fall into his lap. With the improvement in supervision after the war, an energetic clean-up policy is being pursued, the results of felling and burying dead and rotted stumps can be seen almost at once in the decrease in excised leaves, and increase in nut yield. It is intended to study the natural control by Scoliids with a view to the introduction of further species such as the Madagascan *Scolia oryctophaga.*, from Mauritius.

9. *Cotton Insects.*—It is almost true to say that the entire cotton position in Tanganyika is dominated by the insect pest complex, although at a time of abnormally high prices, it might pay the African to share his crop with the insect. Cotton is an unpopular crop for many reasons, chiefly associated with the large amount of labour and numerous restrictions involved in its cultivation. If the insect problem could be solved, the regular cash income would be a great stabilising factor in African economy in the Eastern and Lake Provinces. Yields of around 200 lb. seed cotton per acre and 120 lb. respectively in the two Provinces could be pushed up to 500 and 250 lb. at least.

In introducing the review of cotton pests, it must be stated that the pink bollworm, *Pectinophora gossypiella* Saund. has for the time being ceased to be a problem. Ever since the end of the 1914-18 war, successive Entomologists have seen to it that a strict close season of at least two to three months is enforced, with all standover cotton uprooted and burned by a statutory date. This policy has proved too successful to be subjected to test by modifying it in any way.

The situation in the Lake Province, which produces about two-thirds of the total cotton crop is that Jassid must be overcome by resistance breeding, and that some means of protection of the crop against migrating stainers (*Dysdercus* spp.) must be found. In the latter connection Mr. Prentice of the Empire Cotton Growing Corporation has achieved considerable success by poison baiting with poisoned syrup, which is flicked lightly on to the foliage by means of brushes, and is ingested directly by the stainers. The only limitations of the method are the labour required, and the danger of issuing Sodium arsenite to the public. It is hoped to replace arsenic with one of the new synthetics.

In the Eastern Province, the insect situation is totally different, and is so serious that the cessation of cotton growing has been contemplated. The dominant insect is the American Bollworm, whose insidious activities have been steadily increasing with the rise of maize growing as a cash crop, consequent upon the rise in price over the last five or six years. It has been demonstrated by Mr. Bebbington, of the Empire Cotton Growing Corporation that the main waves of attack arrive on the young flowering cotton from the adjacent maturing maize, and that populations of as few as 2,000-3,000 bollworm larvæ per acre can clear the entire bottom crop by nibbling the successive bolls on each sympodium, and causing shedding or shrivelling. It is now considered unlikely that any practicable modification of planting practice will be found to cope with this insect, and every effort is being made to work out a simple insecticide schedule. Dusting with a number of DDT and Gamma

BHC formulations has been done in a large replicated experiment over twenty-five acres, but the timing of the applications is critical, and the first impression of mortality (fifty per cent) has been somewhat disappointing, due, as in stalk borer control, to the washing of the dust by rain, and the effect of heat and light on the toxic ingredients. Granted the establishment of a sound chemical method the problem of its effective application to the thousands of small native plots would seem almost insuperable. One of the first general steps therefore is to press for some degree of aggregation of cotton growing such that improved agricultural methods, including mechanization of ground preparation can be employed. Such conditions would also appear to be a pre-requisite of Stainer control, the other great problem in Eastern Province cotton growing, in that it might be possible to intercept migrant bands, or to limit them by systematic elimination of alternate host plants, e.g. Sterculia, Baobab, Kapok, within normal mass flight distance of the aggregates.

The need for fundamental research has now been fully recognized in the arrival of an Entomologist at the Ilonga station of the Empire Cotton Growing Corporation, although close co-operation with the Entomologist at Morogoro, eighty-five miles distant, will continue, as in the past, in the field of "Operational Research".

Before leaving the subject of Cotton insects, it is necessary to utter a special word of warning concerning the Red Bollworm, *Diparopsis castanea* Hmpsn. It was thought to have been advancing into Southern Tanganyika from Portuguese East Africa, and indeed the pest has increased in severity during the past five years in the Lindi District. Further searches in 1947 revealed that the species was present in bolls of the wild *Gossypioides kirkii* in plateau thicket on the summits of the chain of Cretaceous Plateaux stretching from the Rovuma River to Bungu, seventy-five miles South of Dar es Salaam, and North of the developing cotton area of the Rufiji delta, where the Red bollworm has never been recorded. A quarantine belt had been established in 1946 to cut off the infestations in cultivated cotton in the Lindi District from the clean Rufiji area, of a width of 140 miles. The 1947 discoveries would appear to reduce the real value of such a belt, but it has been thought wise to retain it until the situation in the Rufiji is investigated further. The occurrence of this dangerous insect so far outside its former haunts is surely of concern to the whole East African cotton industry.

10. *Groundnut Pests.*—An annotated list of recorded pests of the groundnut has been prepared for publication in the *Bulletin of Entomological Research*. Past experience is based solely upon native patchwork cultivation, but it is quite impossible to predict the nature and extent of infestation which is bound to develop sooner or later under the monocultural conditions of the Groundnut Scheme. It is thought that the Tettigometrid, *Hilda patruelis* Stal. which may destroy the crop completely by sucking the stems just below gound level, will prove troublesome. During the past season, the crop in the Kondoa and Singida areas, within 100 miles of the Kongwa units has been severely affected by Hilda. Experiments with Gammexane dusts have shown some promise.

### Pests of Plantation Crops

12. *Sisal Weevil* (*Scyphophorus acupunctatus* Gyll.).—This highly resistant species, an introduction from Central America prior to the first World War, may cause up to fifty per cent loss of young transplants in the period of establishment. Plantation sanitation is inadequate to cope with heavy

attacks, and the problem has been surveyed in the field with a view to drawing up a programme of ecological and chemical control. It has been decided to enlist the services of a special entomologist to do some fundamental ecological work prior to sending to America a mission in search of natural enemies. There may also be scope for large scale insecticide applications, though the weevil has proved to be resistant to DDT and to gamma BHC in all but abnormally heavy dosages. The employment of systematic insecticides is under consideration. The industry is fully alive to the importance of this weevil problem.

13. *Sugar Cane White Grubs.*—There is but a single sugar estate in Tanganyika, with over 3,000 acres under cane, of which about 400 acres are more or less seriously infested with *Melolonthid* larvæ, the chief of which is that of the red cane beetle, *Cochliotis melolonthoides* Gerst. A special study has been made of the bionomics of the beetle, and it has been possible to make recommendations for the import of quicker maturing, resistant varieties of cane, the drastic reduction in the ratooning cycle, introduction of natural enemies, of which the Giant Toad, *Bufo marinus* has already arrived from Trinidad, and the chemical protection of the seed pieces by treatment with DDT or BHC. A suitable food plant for planting on waste ground has been discovered in the Territory, and this may help to raise the local populations of Scoliid wasp parasites to a level of economic efficiency. Since the estate constitutes an almost perfect ecological island of irrigated verdure in a sea of dry African scrub, the importation of a range of foreign Scoliids and Tachinids becomes a reasonable measure.

14. *Coffee Pests.*—Pests of coffee are undoubtedly the best known of any crop pests in Tanganyika, since one of the two Entomologists (F. B. Notley) was engaged, up till the war, almost exclusively in their study. From the economic angle, the Pentatamid *Antestia orbitalis* var. *lineaticollis* Stal. and the white borer the Lamiid *Anthores leuconotus* Pasc. demand constant and active control measures. The use of a DDT emulsion for Antestia is showing great promise, and offers little risk of disturbing the parasite balance, since the Kenya mealybug *Pseudococcus Kenyæ* has hitherto been excluded from Tanganyika. *Anthores* is partially controlled as a routine by hand destruction, but the enhanced strength of the new synthetics give promise of a more efficient means of destruction. An interesting feature of this work is that it offers a test of the degree of success with which modern control methods can be applied to African farm conditions, since a large proportion of Kilimanjaro coffee growers are grouped into an autonomous Co-operative Union. And the prospects are increasingly good. Fundamental research work on the coffee leaf miners has made a useful contribution to our knowledge of natural control under highly adjusted continental conditions.

15. *Onion Thrips.*—This valuable crop is periodically decimated by *Thrips tabaci* Lind., and most promising results have been obtained by spraying regularly with an emulsion of a saturated solution of DDT in Diesel oil made at Morogoro with china clay emulsifier, and diluted to two per cent of oil and 0·2 per cent DDT.

### Pests of Stored Products

16. *Grain Storage.*—This is the most important problem in the programme of the Morogoro Laboratory. The control of infestation is the principal factor in Territorial grain storage, and for a number of years Mr. W. V. Harris has

undertaken research work on behalf of the three East African Territories. Practice has, however sadly lagged behind technical development, and it is only recently that the great loss of food, amounting to upwards of ten per cent of the grain crop, has been realized. All are agreed now that the best technical advice should be obtained and a progressive plan for improving the standards at each storage centre put into operation. The problem is almost wholly concerned with *Calandra oryzæ* L. in maize and millet, bought by Government and stored in eighteen country centres, or contributed to communal African stores in the case of the Central Province. Measures provisionally accepted have been worked out in close collaboration with the Colonial Office Working Party, and are as follows :—

1. All incoming grain is regarded as infested and moist. It is proposed to install farm type grain dryers to bring all grain to a standard moisture content and to heat-treat for infestation. Even if 100 per cent kill is not obtained experience has shown that the subsequent BHC bag treatment helps to maintain a low rate of infestation over long periods.

2. The grain will be stored in bags treated externally with ·5 per cent gamma BHC in draughtproofed insulated stores, thereby preventing changes in moisture content and cross infection by insects.

In addition to these precautions, it is intended to try admixture with 0·5 parts per million of gamma BHC at the primary markets combined with an inspection system which will enable the summary rejection of wet or weevily maize.

### Beeswax

The Morogoro Laboratory has for many years been the centre for the encouragement of the production and cleaning of Beeswax, which is collected in many parts of the Territory and is an important export commodity.

W. F. Jepson,
*Entomologist*

## LIST OF EUROPEAN STAFF AS ON THE 31ST DECEMBER, 1948

*Director:* J. C. Muir, O.B.E., B.Sc. (Agric.), N.D.A., N.D.D., Dar es Salaam.

*Deputy Director:* C. E. J. Biggs, B.Sc. Dip.(Agrig.) (Wye), Dar es Salaam.

*Senior Research Officers:* -

F. R. Sanders, B.A.(Hons.), Dip. (Agric.), Cantab., Lyamungu, Moshi.
G. W. Lock, O.B.E., N.D.A., N.D.D., Mlingano, Ngomeni.

*Entomologists:*

F. B. Notley, M.Sc., A.I.C.T.A., Lyamungu, Moshi.*
W. F. Jepson, O.B.E., B.Sc., A.R.C.S., Ph.D., Morogoro.*

*Plant Pathologist:* G. B. Wallace, B.Sc., Ph.D., Lyamungu, Moshi.

*Botanist:* H. Doggett, B.A., A.I.C.T.A., Ukiriguru, Fela.

*Senior Agricultural Officers:*

D. Sturdy, O.B.E., M.A. (seconded to Jamaica).
H. P. Smart, B.Sc., A.I.C.T.A., Dar es Salaam.
C. J. McGregor, C.D.A., Lushoto.
J. V. R. Brown, B.Sc., Moshi.
A. H. Savile, C.D.A., A.I.C.T.A., Morogoro.*
N. V. Rounce, C.D.A., A.I.C.T.A., Mwanza.
A. S. Stenhouse, B.Sc., N.D.A., Dodoma.
R. D. Linton, B.Sc., Arusha.
A. Pitcairn, Dip. Agric. (Edin.), Dar es Salaam.*
R. B. Allnutt, B.Sc., seconded to Leeward Island.
F. W. Thomas, C.D.A., C.D.F., Iringa.
D. Thornton, B.Sc., Arusha.
H. Gillman, M.Sc., A.I.C.T.A., Dodoma.

*Agricultural Officers:*

H. Marsland, B.Sc., N.D.A., N.D.D., seconded to Economic Control Board.
J. K. Robertson, B.Sc., A.I.C.T.A., Lindi.
T. C. Cairns, B.Sc., Arusha.
T. H. Marshall, F.R.H.S., Mbeya.*
N. R. Fuggles-Couchman, B.Sc., C.D.A., A.I.C.T.A., seconded to the Managing Agency of the Groundnut Scheme.

*Agricultural Officers:—contd.*

J. G. M. King, M.B.E., C.D.A. (Wye), A.I.C.T.A., seconded to Cambridge University as a Lecturer in Agriculture.

J. C. Eyre, B.Sc., D.I.C., seconded to Palestine.

R. J. M. Swynnerton, M.C., B.A., Dip. (Agric.), (Cantab.), A.I.C.T.A., Dar es Salaam.*

M. Lunan, B.Sc., A.I.C.T.A., Tabora.*

J. B. Clegg, B.A., Malindi, Lushoto.

J. T. Purvis, B.Sc., Malya (Maswa).

T. S. Jervis, Bukoba.

R. W. Collett, Mbulu.

F. E. Luscombe, B.Sc., A.I.C.T.A., Moshi.

D. H. Drennan, B.Sc., Dip. Agric. (Cantab.), Mwanza.

H. L. Brett, Lindi.*

E. T. Ward, C.D.A., Mbeya.

A. H. B. Childs, F.L.A.S., M.R.A.C., Iringa.*

C. G. Glegg, Dip. Hort. (Wye), Songea.*

J. D. Hunter-Smith, B.Sc., A.I.C.T.A., Morogoro.

D. Morrison, B.Sc., Dip. Agric., Masasi.

J. S. Gunn, B.Sc., Dip. Agric. (Cantab.), Mbulu.

W. G. Brookbank, Dip. Agric. (Cantab.), A.I.C.T.A., Tanga.

P. E. Hemsworth, B. Com. (Economics), Dar es Salaam.

L. M. Fernie, Lyamungu.

*Plant Physiologist:* E. C. Diekmahns, B.Sc. Hons. (Glasgow), Dip. Agric. Sc (Cantab.), Ngomeni.

*Tobacco Officer:* J. H. McGregor, Biharamulo.

*Tobacco Adviser:* K. B. Louwrens, on leave.

*Agricultural Officers (Ginnery):*

R. I. Butler, Mwanza.

E. Drackley, Mwanza.

*Field Officers:*

P. F. Ellis, on leave.

W. S. Isemonger, Same.

*Fisheries Officers:*

G. J. Lockley, Lake Rukwa (Chunya).

R. E. Gould, Mbeya.

*Senior Agricultural Assistants:*

W. C. Clarke, seconded to Montserrat.
L. Leslie-Moore, Handeni.
W. Sibly-Warne, F.R.H.S., Songea.

*Senior Agricultural Assistants:—contd.*

G. S. Brown, Tukuyu.
A. A. E. Weirich, Tanga.
R. B. Silcock, Kilosa.

*Agricultural Assistants:*

A. Taylor, Bugufi.
R. Seager, on leave.
B. R. D. Eccles, Lyamungu.
E. Pienaar, Lyamungu.*
A. E. Favell, Bukoba.
F. Parke, Ilonga.
D. H. Thwaites, Iringa.
T. W. H. Dore, Dodoma.*
D. Shepstone, Kigoma.
V. I. Luxenburg, Bagamoyo.*
G. H. McGavin, Lushoto.*
L. J. Lloyd, Bagamoyo.
P. G. Lewis, Pangani.
T. J. Taverner, on leave.*
V. Allen, Mwanhala.
J. C. Van Schoor, Masasi.*
J. V. Morris, Lyamungu.
D. V. Jacob, Ngomeni.
W. E. Yeo, Sumbawanga.
D. R. A. Goode, Iringa.*
K. Johnsen*
J. Allison, Arusha.*
J. F. Tregarthen, Ukiriguru.
M. L. Reiner, Kondoa-Irangi.
R. Simpson, on leave.
N. A. MacLellan, Biharamulo.*
P. Long, Kilosa.*
A. M. Pienaar, Morogoro.*

*Agricultural Assistants:—contd.*

J. I. Thomson, Kilosa.
W. F. Routledge, Songea.
E. Hall, Moshi.
G. L. Goodhew, Utete.
R. C. Faunn, Arusha.*
R. M. Kendall, Muheza.*
J. Colston, Shinyanga.
V. C. Allen, Singida.
K. H. Groves, Lyamugu.
J. H. Miles, Lindi.
R. C. Flint, Kibondo.
A. S. de Beer, Mbulu.
L. B. Neary, Dodoma.*
J. M. Van Dyk, Bukoba.
A. Jackson, Mahiwa.
T. E. Oliver, Kondoa-Irangi.
A. Priestner, Biharamulo.
J. Little, Ukiriguru.
S. D. Pyman, Mwanhala.*
W. J. Jones, Ngudu.
H. E. Hubbard, Kingolwira.*
R. G. N. Bickel, Mahiwa.*
J. M. Ainley.
R. A. Brown.
B. J. Lumby.
A. A. Spencer.
W. I. Reece.

*Served with Forces

## District Production Committees

*Executive Officers:*

H. A. Wilkin, Arusha.

W. L. Blofeld, Iringa.

*Education Officer:* J. Hebenton, Ukiriguru.

*Temporary Scientific Assistant:* Mrs. M. Wallace, B.Sc., M.Sc., Lyamungu.

*Office Superintendent:* K. C. Pearson, Dar es Salaam.

*Stenographer:* Miss M. Wetjen, Dar es Salaam.

## LIST OF PUBLIC GINNERIES LICENSED IN 1948

| Province and District | Locality | No. of Gins | | Licencees |
|---|---|---|---|---|
| | | Saw | Roller | |
| *Eastern :* | | | | |
| Morogoro ... | Morogoro ... | — | 22 | Tanganyika Cotton Co., Ltd. |
| Morogoro ... | Mikesse ... | — | 20 | Ladaks, Ltd. |
| Morogoro ... | Ngerengere ... | — | 11 | Liverpool Uganda Co., Ltd. |
| Morogoro ... | Duthumi ... | — | 20 | Tanganyika Cotton Co., Ltd. |
| Morogoro ... | Turiani ... | — | 16 | Tanganyika Cotton Co., Ltd. |
| Kilosa ... ... | Kilosa ... | — | 18 | Kilosa Ginnery, Ltd. |
| Kilosa ... ... | Rudewa ... | — | 22 | Tanganyika Cotton Co., Ltd. |
| Kilosa ... ... | Msowero ... | — | 16 | Msowero Ginnery, Ltd. |
| Bagamoyo ... | Mandera ... | — | 20 | Liverpool Uganda Co., Ltd. |
| Rufiji ... ... | Kilimani ... | — | 18 | Rufiji Ginneries, Ltd. |
| Rufiji ... ... | Msomeni ... | — | 15 | Rufiji Ginneries, Ltd. |
| Rufiji ... ... | Logeloge ... | — | 12 | Rufiji Ginneries, Ltd. |
| Ulanga ... ... | Kiberege ... | — | 16 | Devjibhai K. Hindocha. |
| Ulanga ... ... | Malinyi ... | — | 12 | Devjibhai K. Hindocha. |
| *Lake :* | | | | |
| Mwanza ... | Mwanza ... | — | 28 | Nakasero Commercial Corporation Ltd. |
| Mwanza ... | Murutunguru | — | 24 | Ladha Meghji and Sons, Ltd. |
| Mwanza ... | Ihale ... ... | — | 14 | Mwanza Cotton Trading Co., Ltd. |
| Mwanza ... | Bukumbi ... | — | 15 | Bhagwanji Sunderji and Co., Ltd. |
| Mwanza ... | Nassa ... | — | 20 | Sikh Ginners. |
| Mwanza ... | Buchosa ... | — | 14 | Buchosa Cotton Co., Ltd. |
| Kwimba ... ... | Pambani ... | — | 17 | Pambani, Ltd. |
| | Nyambiti ... | — | 20 | Kwimba Ginneries, Ltd. |
| Musoma ... ... | Mugango ... | — | 20 | Musoma Industries, Ltd. |
| Maswa ... ... | Malampaka | — | 12 | Bhagwanji Sunderji and Co., Ltd. |
| Maswa ... ... | Luguru ... | — | 14 | Bhagwanji Sunderji and Co., Ltd. |
| Shinyanga ... | Usogore ... | — | 14 | Bhagwanji Sunderji and Co., Ltd. |
| *Northern :* | | | | |
| Moshi ... ... | Moshi ... | — | 24 | Moshi Trading Co., Ltd. |
| Mbulu ... ... | Idulu ... | — | 12 | Jamal Ramji and Co., Ltd. |
| *Southern :* | | | | |
| Lindi ... ... | Mtua ... | — | 14 | Kikanda Cotton Trading Co., Ltd. |
| Tunduru ... | Tunduru ... | — | 14 | Kikanda Cotton Trading Co., Ltd. |
| Mikindani ... | Mikindani ... | — | 5 | Mikindani Cotton Co., Ltd. |
| *Tanga :* | | | | |
| Korogwe ... | Korogwe ... | — | 26 | Moshi Trading Co., Ltd. |
| Handeni ... ... | Sindeni ... | — | 11 | Moshi Trading Co., Ltd. |

# COTTON STATISTICS: SEASON 1948

*Appendix III*

(By District)

| Provinces and Districts | No. of Growers (Approximate) | Quantity of seed distributed in tons | Quantity of seed—cotton marketed | | | Approximate Total Cash Revenue to natives Shs. |
|---|---|---|---|---|---|---|
| | | | 1st Grade Tons | 3rd Grade Tons | Total Tons | |
| *Lake:* | | | | | | |
| Musoma ... ... ... ... | 10,500 | 610 | 1,504 | 188 | 1,692 | 834,120 |
| Mwanza ... ... ... ... | 80,000 | 2,557 | 14,634 | 441 | 15,075 | 7,926,960 |
| Kwimba ... ... ... ... | 30,560 | 1,421 | 5,175 | 188 | 5,363 | 2,807,880 |
| Maswa ... ... ... ... | 25 500 | 1,252 | 3,617 | 224 | 3,841 | 1,975,080 |
| Shinyanga ... ... ... ... | 14,000 | 535 | 1,616 | 52 | 1,668 | 876,360 |
| *Tanga* | | | | | | |
| Lushoto ... ... ... ... | 4,000 | 40 | 159·058 | 27·538 | 186·596 | 98,007·39 |
| Handeni ... ... ... ... | 5,800 | 82 | 196·203 | 47·390 | 243·593 | 119,523·87 |
| South Pare ... ... ... ... | 5,000 | 57 | 72·085 | 14·794 | 86·879 | 44,833·69 |
| North Pare ... ... ... ... | 4,000 | 30 | 11·243 | 2·476 | 13·719 | 7,023·92 |
| *Northern :* | | | | | | |
| Arusha ... ... ... ... | 400 | 7 | 2·75 | 0·5 | 3·25 | 1,705·54 |
| Moshi ... ... ... ... | 1,600 | 30 | 64·00 | 10·0 | 74·00 | 39,287·11 |
| Mbulu ... ... ... ... | 200 | 2 | 1·25 | 0·5 | 1·75 | 1,810·45 |
| *Eastern :* | | | | | | |
| Kilosa ... ... ... ... | 6,694 | 316 | 591 | 148 | *1,188 | 371,680 |
| Morogoro ... ... ... ... | 6,570 | 379 | 862 | 185 | †1,235 | 527,200 |
| Ulanga ... ... ... ... | 12,200 | 226 | 817 | 142 | 959 | 437,100 |
| Bagamoyo ... ... ... ... | 6,934 | 116 | 712 | 60 | 772 | 402,560 |
| Rufiji ... ... ... ... | 11,247 | 121 | 96 | 28 | 119 | 50,340 |
| Uzaramo ... ... ... ... | — | — | 14 | 4 | 18 | 8,760 |
| *Southern :* | | | | | | |
| Lindi ... ... ... ... ... | 400 | 6 | 6·5 | 0·33 | 6·83 | 3,500 |
| Masasi ... ... ... ... | 400 | 6 | 2·75 | 0·66 | 3·41 | 1,500 |
| Tunduru ... ... ... ... | 1,200 | 18 | 52·5 | — | 52·5 | 24,750 |
| Mikindani ... ... ... ... | 1,200 | 18 | 18·0 | 3·0 | 21 | 10,650 |
| Total ... | 228,405 | 7,829 | 30,206·774 | 1,767·188 | 31,986·527 | 16,569,631·97 |

*Includes 449 tons of planters' crop cotton. †Includes 188 tons of planters' crop cotton.

## DETAILS OF PROVISION AND EXPENDITURE

| Sub-head | Provision from 1/1/1948 to 31/12/48 £ | Expenditure from 1/1/48 to 31/12/48 £ |
|---|---|---|
| **Head 5. Agriculture** | | |
| *Personal Emoluments* | | |
| 1 to 43. Personal Emoluments ... ... ... ... ... | 95,550 ... | 98,546 |
| *Other Charges* | | |
| 44. Transport and Travelling ... ... ... ... ... | 18,000 ... | 17,158 |
| 45. Maintenance and Running of Motor Vehicles ... ... | 3,000 ... | 2,734 |
| 46. Books of Reference ... ... ... ... ... ... | 650 ... | 219 |
| 47. Contingencies ... ... ... ... ... ... | 110 ... | 187 |
| 48. Office and General ... ... ... ... ... ... | 1,000 ... | 1,075 |
| 49. Tents ... ... ... ... ... ... ... ... | 400 ... | 356 |
| 50. Uniforms ... ... ... ... ... ... ... | 1,750 ... | 2,385 |
| 51. Agricultural Development Special Services ... ... ... | 450 ... | 295 |
| 52. Contribution to Native Treasuries Seed Farms ... ... | 1,140 ... | 1,126 |
| 53. Expenditure on Cotton Tax Services ... ... ... ... | 4,000 ... | 3,747 |
| 54. Increased Food Production : | | |
| (a) Crop Production ... ... ... ... ... | 3,500 ... | 3,464 |
| (b) Production of Vegetable Seeds ... ... ... | 50 ... | 17 |
| (c) Expenses of Production Committees ... ... | 900 ... | 598 |
| 55. Laboratory Equipment ... ... ... ... ... ... | 6,900 ... | 499 |
| 56. Plant Sanitation ... ... ... ... ... ... ... | 400 ... | 329 |
| 57. Purchase of Planting Material ... ... ... ... ... | 200 ... | 40 |
| 58. Tools, Implements and Equipment ... ... ... ... | 600 ... | 831 |
| 59. Sisal Experimental Station, External Field Trials ... ... | 2,000 ... | 1,469 |
| 60. Upkeep of and Minor Improvements to Agricultural Stations | 18,820 ... | 13,982 |
| 61. Upkeep of Agricultural Training Centres and Ploughing Schools ... ... ... ... ... ... ... | 350 ... | 234 |
| 62. Upkeep of Coffee Research Station ... ... ... ... | 5,500 ... | 5,720 |
| 63. Upkeep of Government Plantations ... ... ... ... | 500 ... | 414 |
| 64. Improvement of Copra Industry ... ... ... ... | 400 ... | 359 |
| 65. Bukoba Coffee Culture ... ... ... ... ... ... | 500 ... | 226 |
| 66. Citrus Industry Grading and Inspection ... ... ... | 100 ... | 87 |
| 67. Haricot Bean Production ... ... ... ... ... | 500 ... | 98 |
| 68. Onion Nursery, Mbulu ... ... ... ... ... ... | 1,000 ... | 7 |
| 69. Purchase of Motor Vehicles ... ... ... ... ... | 1,000 ... | 4,376 |
| 70. Purchase of Machinery for Sisal Experimental Station ... | 1,000 ... | — |
| 71. Multiplication of Seed ... ... ... ... ... ... | 900 ... | 859 |
| 72. Production of Nicotine Sulphate ... ... ... ... | 250 ... | — |
| *Special Expenditure* | | |
| 73. Maize Bonus Payments ... ... ... ... ... ... | 48,000 ... | 72,409 |
| 74. Electricity Supply, Mlingano ... ... ... ... ... | 420 ... | — |
| 75. Telephone Extensions Mlingano ... ... ... ... | 100 ... | — |
| 76. Library Shelving and Purchase of Books ... ... ... | 300 ... | — |
| 77. Chemical Control of Weeds ... ... ... ... ... | 500 ... | — |
| 78. Purchase of Wheel Barrows ... ... ... ... ... | 250 ... | 188 |
| 79. Two Temporary European Quarters and Furniture, Arusha and Sumbawanga ... ... ... ... ... ... | — ... | 287 |
| 80. Acquisition of Camphor Factory Building ... ... ... | — ... | 25 |
| 81. Purchase of Gammexane ... ... ... ... ... | — ... | 494 |
| 82. Purchase of Anti-Locust Equipment ... ... ... ... | — ... | 3,044 |
| 83. Contribution to Agricultural Show, Northern Province ... | — ... | 121 |
| | £ 215,090 ... | £ 238,005 |

DEVELOPMENT FUNDS RECURRENT EXPENDITURE
PROVISION AND EXPENDITURE

**D.—1. CONSERVATION AND DEVELOPMENT OF NATURAL RESOURCES, AGRICULTURE AND ANIMAL HUSBANDRY**

| | Provision from 1/1/48 to 31/12/48 | Expenditure from 1/1/48 to 31/12/48 |
|---|---|---|
| | £ | £ |
| 1. Training of Agricultural Instructors | 13,460 | 6,581 |
| 2. Agricultural Training for Indians | 2,650 | — |
| 4. Improvement of Supplies of Planting Material | 2,095 | 417 |
| 5. Development of Tobacco Industry | 3,930 | 1,017 |
| 6. Improvement of Copra Industry | 2,570 | 1,510 |
| 8. Extension of Ukiriguru Experimental Station | 3,120 | 3,094 |
| 9. Bukoba Coffee Sub-Station | 1,777 | 238 |
| 12. Soil Conservation : Eastern Kilimanjaro | 1,035 | 451 |
| 13. Cotton Experimental Station, Ilonga | 3,120 | 552 |
| 14. Rehabilitation of Uluguru Mountains | 5,510 | 555 |
| 17. Development of Tumbi and Mwanhala Experimental Stations | 1,010 | 774 |
| 18. Development of Rice Production, Southern Province | 1,280 | 792 |
| 19. Improvement of Beeswax | 1,010 | 5 |
| 20. Fisheries | 3,810 | 1,440 |
| 23. Development of Ufipa District | 330 | 4 |
| 24. Development of Cotton Industry, Lake Province | 110 | 120 |
| | 46,817 | 17,550 |
| **COLONIAL DEVELOPMENT AND WELFARE SCHEME** | | |
| Soil Conservation | 3,000 | 478 |

DEVELOPMENT FUNDS CAPITAL EXPENDITURE—PROVISION AND EXPENDITURE

**D.—5. CONSERVATION AND DEVELOPMENT OF NATURAL RESOURCES, AGRICULTURE AND ANIMAL HUSBANDRY**

| | Provision from 1/1/48 to 31/12/48 | Expenditure from 1/1/48 to 31/12/48 |
|---|---|---|
| 1. Training of Agricultural Instructors : | | |
| (a) Ukiriguru Instructors School | 18,000 | 5,088 |
| (b) Lyamungu Instructors School | 1,000 | 3 |
| 3. Houses for Field Officers | 3,554 | 489 |
| 5. Improvement of Copra Industry | 1,000 | 50 |
| 7. Extension of Ukiriguru Experimental Station | 32,900 | 10,850 |
| 8. Bukoba Coffee Sub-Station | 10,200 | 453 |
| 10. Construction of Dams for Development of Rice Production | 3,600 | 1,821 |
| 12. Housing for African Agricultural Instructors | 4,900 | 1,758 |
| 13. Cotton Experimental Station, Ilonga | 2,000 | 7,203 |
| 14. Rehabilitation of Uluguru Mountains | 250 | 26 |
| 17. Luengira and Kitivo Irrigation Scheme | 1,500 | 128 |
| 18. Development of Tumbi and Mwanhala Experimental Stations | 1,200 | 1,158 |
| 19. Development of Rice Production, Southern Province | 650 | 264 |
| 21. Improvement of Furrows in Moshi Lowlands | 2,000 | 1,161 |
| 22. Cowshed at Coffee Research Station | 400 | 55 |
| 23. Purchase and Erection of Saw Gin | 1,675 | — |
| 24. Reorganization of Bukoba Native Coffee Industry | 5,000 | — |
| 27. (a) Development of Tobacco Industry | 2,000 | 951 |
| 27. (d) Agricultural Development Ufipa District | 1,000 | 299 |
| 27. (f) Printing and Distribution of "Agriculture in the Cultivated Steppe" | 1,600 | — |
| | 94,429 | 31,757 |
| **COLONIAL DEVELOPMENT AND WELFARE SCHEME** | | |
| Soil Conservation | 17,225 | 1,558 |